Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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- Cathodic Protection — P.5
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FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
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4	Oils	9	Miscellaneous

Use of funds for printing this publication has been approved by the Director of the Bureau of the Budget November 23, 1956.

0.118 TESTING CAN HEADSPACE GAS

Kohn, G. (American Can Company, Newark, New Jersey)
Food Engineering 29, 54, 56 (April 1957)

The headspace gas in cans of spoiled food may be used in some cases to identify the type of food spoilage that has occurred. Sampling of the gas by the use of the sampling device shown (see over) makes that task easy, safe, and sure.

In a can of food with bulged ends, the bulge is generally caused by either (1) the production of carbon-dioxide gas by growing microorganisms, or (2) the production of hydrogen gas, a byproduct of container corrosion. To determine which of the gases are present, the analyst simply punctures the can and holds a lighted match near the opening while the gas is escaping. If the escaping gas is hydrogen it will ignite and burn, whereas if the gas is carbon dioxide it will not burn.

However, when the can is punctured hydrogen gas, if present, may escape so fast that it will blow out the match and give the impression that the gas will not burn. If a considerable amount of hydrogen is present, the flame which results upon ignition may be large enough to burn the hands of the analyst.

With the new sampling device, the analyst can control and regulate the escape of the headspace gas and eliminate the possibility of a wrong impression or burned fingers. The new device consists of a hollow tube puncturing head provided with a soft rubber gasket of the type used on can vacuum gages. This puncturing head is attached to an ordinary stopcock that leads to a pipe about 4 inches in length.

To use the sampling device, the analyst closes the stopcock and forces the sharp point of the puncturing head through the lid of a can. As the point enters the can, the soft rubber gasket surrounding

(over)

 ABSTRACTER: Martin Heerdt

2.01 SPECIFICITY OF TRIAMINEOXIDEASE

Tarr, H. L. A. (Pacific Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada 5, 187-196 (November 1940)

Certain bacterial cells have previously been shown to possess an enzyme that activates trimethylamine oxide and renders it capable of being reduced by many dehydrogenose systems of lower potential level. The author had previously suggested the name "Trimethylamineoxidase" for this enzyme. In the present paper, reasons are given for substituting the more general and concise designation "Triamineoxidease" for the enzyme.

Experimental. -- The organisms used included the following that had been employed by the author in previous experiments: cultures nos. 1 (Micrococcus), 18 (Micrococcus), and 22 (Achromobacter). Cultures C2, C8, and 4 possessed the following characteristics: culture C2, isolated from butter with "surface taint" and capable of producing this defect experimentally; member of the genus Escherichia culture C8, isolated from a similar source and capable of producing the same defect in butter as culture C2; it appears to be a member of the genus Aerobacter. Culture 4, isolated from well-water obtained from a creamery noted for its production of butter with surface taint, and capable of producing this defect under experimental conditions; it appears to be a member of the genus Pseudomonas.

Washed suspensions of the cells of these organisms were prepared using a sterile 0.85 percent solution of sodium chloride adjusted to a pH of approximately 7.0 with phosphate buffer.

The organic bases used in this series of experiments included the following: (1) trimethylamine oxide, (2) triethylamine oxide, (3) tri-n-propylamine oxide, (4) ergothioneine, (5) stachydrine, (6) choline hydrochloride, (7) betaine hydrochloride, and (8) acetylcholine bromide.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

1.953 WHALE INDUSTRIES

Schubert, K.
Handbuch der Seefischerei Nordeuropas 11, No. 6, 106 pp. (1955)
World Fisheries Abstracts 8, 3-4 (January-February 1957)

This book gives a survey on the world whaling industry (includes nearly 1,000 refs.). Section 1 outlines the natural history. The zoological aspects include a special paragraph on age and weights. Section 2 comprises the international legal problems of whaling. An appendix contains verbatim texts of recent laws and agreements. Section 3 deals with whale hunting. Since over 80% of whaling takes place in the southern hemisphere, conditions there are given the most consideration. Fin whales, blue whales and sperm whales have the greatest economic importance.

The taking of sperm whales is described in Section 4. The principal catch of this whale, which supplies the spermaceti wax, was formerly in the "South Sea," but now it is caught mainly off the South American west coast. Section 5 covers the hunting of small whales in North Europe, Newfoundland and Labrador, and off Japan. Originally, they were taken with nets, hand-harpoons and poisoned arrows; nowadays, they are caught with harpoon cannons and special guns. Nets for taking small whales are used, if the skin of these whales is to remain undamaged. The technological basis of whaling and the processing of large whales in the pelagic whaling industry, e.g., whaling from factory ships instead of from land stations, are described in Section 6. Wireless telegraphy, direction finders and radar are mentioned as prerequisites for modern whaling. Modern whaling boats, floating factory equipment and land stations are also described. The technique of catching giant whales is particularly outlined. It was not until the middle of the last century that a useful harpoon cannon was designed. That was the beginning of modern whaling. The harpoon is 1.5 m. (4.9 ft.) long, on the head of which a grenade of about 40 cm. (1 ft. 4 in.) in length and of about 9 kg. (20 lb.) in weight is screwed. The

(over)

 ABSTRACTER: A. von Brandt

2.113 PROTECTION FOR PLYWOOD - PRESERVATIVES STOP SHIPWORMS, BUT NOT BARNACLES

Taylor, F. H. C. (Fishery Biological Station, Nanaimo, B. C., Canada)
Western Fisheries 54, 26, 48-49 (April 1957)

In the coastal waters of British Columbia, two marine organisms constitute a serious menace to wooden structures. These are the shipworm, a boring mollusc, and the gribble, a small crustacean.

Shipworms, after a free-swimming larval period, bore into the interior of the wood and form burrows approximately 2 feet in length by $\frac{1}{2}$ inch in diameter. Under certain conditions the burrows may be up to 4 feet in length and 1 inch in diameter.

Gribble produce a maze of small, partially open, fret-work tunnels, that eventually destroy the surface of the wood. Gribble have no free-swimming period but, upon emerging from the brood pouch of a female, immediately construct burrows within the wall of the parent burrow.

Experimental. -- A preliminary four-year study of the effectiveness of various types of preservatives in preventing attack by shipworms and gribble on plywood was started in 1953.

Three types of preservatives were used, those applied under pressure (creosote and pentachlorophenol), by cold immersion (copper naphthenate), and as brush-applied preservatives (Osmo-creo, Pentox dark green, and Cop-R-Nap). Each was applied according to the manufacturers' specifications.

Each treatment was applied to three test panels, 1 foot square and $\frac{3}{4}$-inch thick, of 7-ply

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 ABSTRACTER: Kathryn L. Osterhaug

HEADSPACE GAS TESTER

MODERN WHALING

TRIAMINEOXIDEASE

WOOD PRESERVATIVES

1.953

grenade is charged with about 1 kg. (2.2 lb.) of gunpowder, which is exploded by a time fuse. The total length of the harpoon is 1.85 m. (6 ft.), the weight is 65 to 70 kg. (143.3 to 154.3 lb.). The tip of the harpoon is provided with 4 flukes of about 30 cm. (1 ft.) in length each, which can move up to 90°. The shaft has a long slit, through which the forerunner is fastened. The forerunner is made of Manila (38 mm. or 1½ in.), nylon (33 mm. or 1 5/16 in.) or Perlon (34 mm. or 1 3/8 in.). The breaking resistance of the forerunner is about 8 to 10 tons and is 100 to 120 m. (328 to 394 ft.) long. It is frequently combined with the whale line by an intermediate line, both lines being made of Manila. The whale line is about 200 m. (656 ft.) long and about 6 cm. (2 3/8 in.) in diam. It has a breaking resistance of 22 to 25 tons. In all 4 to 5 whale lines are spliced together.

Attempts are being made to develop methods with quicker killing effect, i.e., more efficient explosives are being used, killing by poison (curare and prussic acid), use of gas grenades (compressed CO_2 or N) and by electricity. The latter method would also prevent the whale meat from being infected by the intestinal bacterial flora after the organ becomes damaged by grenades. A 220-AC is used for that purpose. Death results from a shot into the muscle with a weak current (35 to 60 amp.) or from a shot into the intestines with a stronger current (78 to 92 amp.). The electrical killing is not only quicker than that by grenades (10 min. instead of 45), but also reduces the amount of equipment to be carried: no line or only one instead of 6 lines per whaling boat and no grenade instead of 400. It avoids, moreover, the loss of any whales (2 to 20 per whaling boat) and prevents splinters of grenades appearing in the cookers (continued on Card 2). (Omitted).

2.113

Douglas fir plywood. The plywood had an average moisture content of 3.68 percent.

The plywood panels were mounted on three racks, each containing three control (untreated) panels and twelve test panels, one for each treatment. The racks were suspended from the Biological Station dock, below low tide level, 1 foot off the bottom on March 17, 1953. They were left in the water for the following intermittent intervals: (1) 148 days or approximately 5 months (2) 288 days or about 10 months, and (3) 168 days. These intervals provided a total of 704 days, about 23 months of immersion. All control panels were renewed after the second examination. The experiments will continue until all treated panels are lost or disintegrate.

On each examination, a rough qualitative assessment was made of the degree of fouling by barnacles and mussels. The panels were then scraped clean and examined for signs of attack by gribble. An X-ray photograph was taken of each panel and a count of the number of shipworms present was made from it. Although the panels were out of water long enough at each examination to kill all of the organisms present, the recorded estimates for both gribble and shipworm attacks were cumulative.

Results.--(1) All of the treatments used provided almost complete protection from shipworm attack and, except for the Cop-R-Nap and possibly the pentachlorophenol and Osmo-creo treatments, good protection from gribble attacks, for a period of up to 5 months.

(2) After approximately 23 months immersion, all creosote and copper naphthenate treatments were still very effective in preventing gribble attack, but only the three creosote treatments and the 49-hour treatment in copper naphthenate containing 3¼ percent copper were still completely effective in preventing shipworm attack.

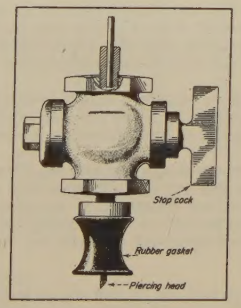
(3) Both pentachlorophenol treatments were no more than moderately effective after 5 months in preventing shipworm attack. For both treatments the damage by gribble was light after 15 months and medium after 23 months.

(4) In general, brush treatments were less effective in preventing both gribble and shipworm attack then were either pressure or immersion treatments.

(5) None of the treatments used materially reduced fouling by barnacles and mussels.

0.118 (Cross Reference: 3.338)

the hollow tube makes a gas-tight contact with the surface of the lid and prevents the escape of any gas in the can. To release the gas the analyst opens the stopcock as slowly or as rapidly as desired. A lighted match held at the end of the discharge pipe will tell safely and without error if the gas is combustible.



2.01 (Cross Reference: 0.38)

These compounds were dissolved in distilled water, neutralized where necessary with sodium hydroxide solution, and sterilized by means of a Seitz filter. The solutions were prepared shortly before use in 0.025, 0.05, or 0.10 M concentration and stored at approximately 1.5° C.

Volatile base formation from these various compounds was studied only under anaerobic conditions using Thunberg tubes. Each tube received 1 ml. of an 0.025, 0.05, or 0.10 M solution of the organic base; 1 ml. of a solution containing equal parts of 0.1 M glucose and 0.1 M sodium lactate (mixed oxidizable substrate); 1 ml. of 0.2 M phosphate buffer pH 7.0; and 2 ml. of bacterial suspension. The tubes containing the solution were evacuated thoroughly with a water pump, and were then incubated at 25° C. for about 18 hours. At the end of this time the whole contents of each tube were washed into a laboratory-made "Conway dish" and, after adding 0.5 ml. of strong formaldehyde and 1 ml. of saturated aqueous solution of potassium carbonate, the amount of volatile base was determined in the usual manner. The results of these experiments are presented in tabular form.

It was found that all six cultures studied exhibited a similar specificity toward each of the organic bases investigated. The enzyme which activates trimethylamine oxide exhibits a well-defined substrate specificity. It will activate at least the lowest three members of the homologous series of compounds having the general structure $R_3N{=}O$, which might be regarded as O-alkyl dialkyl hydroxylamines, $R{-}N\langle^{O-R}_{R}$. On the other hand, compounds that possess the $(CH_3)_3\,N\langle^{O-}_{C\equiv}$ grouping are not activated.

In view of these results, and the specificity of this enzyme toward triamine oxides, it is suggested that it be named Triamineoxidease.

Triamineoxidease exists in the cells of bacteria from widely different sources, including spoiling fish muscle, well-water, and surface taint butter. It has been demonstrated in organisms from five different genera.

2.02 CHEMICAL STUDIES ON THE RED MUSCLE, "CHAI" OF FISHES, VI. SOLUBILITIES OF RED MUSCLE MYOGLOBINS AND BLOOD HEMOGLOBINS

Matsuura, Fumio and Hashimoto, Kanehisa
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 408-412 (1956) (English abstract, table, and figures)

The solubilities of myoglobins of tuna, Parathunnus sibi, and swordfish, Makaira mitsukurii, were determined in the phosphate buffer solution of high ionic strength and compared with those of some other myoglobins and hemoglobins. In the first experiment, solubility determinations were carried out on carbonyl derivatives of these pigments in a phosphate buffer solution of constant pH (6.6) and at a constant temperature (20° C.). The results obtained, table 1 (see over), show that the solubilities of tuna and swordfish myoglobins lie between those of fish or mammalian myoglobins, on one side and horse myoglobins on the other side. It appears, therefore, that Drabkin's method of myoglobin determination, which is based on the selective salting-out of hemoglobin phosphate buffer solution (3M, pH 6.6, and $\gamma/2$ ca, 6), is not always adaptable in cases of fish. In addition, the solubilities of carbonyl-, reduced-, cyanmet-, and met-myoglobin of tuna were compared and found to be very close to each other, although met-form is slightly more soluble than the others. Recrystallization of this pigment effected no appreciable change in the solubility.

The second experiment, performed to study the influence of pH and temperature on the solubility of tuna met-myoglobin resulted in some interesting findings. This myoglobin has no minimal solubility between pH 4.54 and 6.20 and between pH 6.00 and 7.20, in spite of the fact that the isoelectric point of this myoglobin is found between pH 6 and 7. This phenomenon is perhaps due to the interaction between the myoglobin molecule and some of the ionic components of the salt. This protein has a typical negative temperature coefficient over a wide range of temperature (0°~44° C.), which seems to be a relatively rare situation.

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Authors' summary

2.1474 SHELLFISHING METHODS IN BRITTANY

Brandt, A. V.
World Fishing 6, 48-49 (April 1957)

Every type of craft, but chiefly the smallest, often boats handled by a single man, take part in the shellfishery of Brittany. As potting or creel fishing is chiefly carried out along the rocky inlets where the crustaceans live, the fisherman is less worried by modern developments than is the fisherman engaged in sardine or tunny fishing. No revolutionary change in the catching methods employed for shellfish is anticipated in the near future.

Fishing with crab and lobster pot, and creels extends along the entire coast as far south as Portugal. The creel is the typical gear of the small boats that operate within a limited radius of the Breton ports. According to their size, a few carry up to 40, and occasionally as many as 60 to 80 creels.

The smallest type of creel serves for the crab catch ("crevette"). They are either made of netting or of tarred looped wire. The looped wire is in hexagonal loops of about 3/8-inch diameter. The bait, consisting of small fish or fish heads, is hung in net-shaped bags inside the creel. The creel is mounted on strong wooden lasts whose ends are secured with heavy stones.

The classical type of lobster pot or basket is of a semi-circular shape, about 18 inches high with an opening on the top side. Willow or chestnut, preferably, or else cane or tamarisk are the types of wood used in their construction. Beside the semi-circular basket, a long type is sometimes constructed whose sides consist of a network of wooden sticks.

The long-shaped pots are mainly used for spiny lobsters and are of lighter construction. They measure from 3 to 3½ feet in length. The opening is either on the top or the side.

The main fishing season on the Breton coast is between March and October. During the colder months the lobsters retire to deeper waters.

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ABSTRACTER: Kathryn L. Osterhaug

2.1121 THE GRANTON TRAWL - PART 1

Garner, John
World Fishing 6, 45-47 (April 1957)

The Granton trawl is of the type used on board most deep-sea trawlers today. The total weight is almost 4½ tons with the weight of the net piece accounting for only ¼ of a ton. There are eleven main net pieces used to make the trawl.

Lower wing. -- The lower wing is the longest and narrowest net part of the trawl; it is just 61 feet long and decreases from 50 meshes down to 17 meshes. The construction is as follows: 40 meshes of single and 10 meshes of double twine are set up from the selvedge end, using 5½-inch mesh. Creasings are put in the selvedge every third row until 17 meshes are reached, then to keep the 17 meshes constant, creasings are put in every second row until the required length is achieved. There are 133 flymeshes in a lower wing.

A pair of lower wings. -- Lower wings are usually braided in pairs. The construction is as follows: 200 meshes are set-up, and three rows of double twine are braided (this includes the bosom meshes), then 40 meshes of single twine and 10 meshes of double twine are braided from each selvedge; thus starting each wing. After 10 meshes of each wing have been braided the double mesh finishes. The wings are then completed as described above. Double corners are achieved by superimposing further braiding using double meshes at the corners to provide extra strength.

A square and top wings. -- These are usually the most confusing parts of a trawl because of the two "quarters" contained in these net pieces. They are braided as follows: 260 meshes of double twine are set up and two rows are braided, after which single twine is used. Batings are put in each selvedge every fourth row until the meshes across are down to 200 meshes, the square is then completed and will measure 27 feet 6 inches along the selvedge, 5¼-inch mesh being used throughout.

The square is then reversed and the two top wings are braided onto the 260-mesh end of the square.

(over)

ABSTRACTER: Kathryn L. Osterhaug

3.12 COMPARATIVE STUDIES OF THE EFFECTS OF THE TETRACYCLINE GROUP OF ANTIBIOTICS IN THE PRESERVATION OF FISH

Stern, Joseph A.; Liebman, Harmon L.; Grauer, Alan D.; Kudo, George; and da Costa, Antonio A. (School of Fisheries, University of Washington, Seattle)
Antibiotics Annual 1956-1957, pp. 984-996 (1957) Medical Encyclopedia, Inc., New York, N. Y.

As a result of previous work by a number of investigators, it has become apparent that, of the antibiotics investigated to date, only the tetracycline group and, to a minor extent, chloramphenicol hold promise as commercially practical preservatives for use in the fishing industry.

This paper reports a study of the effects of the members of the tetracycline group of antibiotics on the preservation of demersal fish under conditions that might be found aboard ship. Chemical tests for freshness of fish were used to supplement organoleptic judgments in the evaluation of the condition of the fish.

Experimental. --English sole (Parophrys vetulus), a white-fleshed, bottom-dwelling fish with a low fat content, was the species used in this investigation. All of the fish were taken by otter trawl in Puget Sound.

The experimental work was divided into three parts: (1) a comparative study of the spoilage of fish stored in brine (3 percent NaCl) with that of fish stored in brine containing 0.04 percent citric acid; (2) a comparative study of the spoilage of fish stored in brine with that of fish stored in brines containing equal molar concentrations of the tetracycline antibiotics; and (3) a comparative study of the spoilage of fish stored in brine with that of fish stored in brines containing 0.04 percent citric acid and equal weights of activity of the tetracycline antibiotics. In each of the experiments with the

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ABSTRACTER: Kathryn L. Osterhaug

RED MUSCLE OF FISH

TRAWL NET CONSTRUCTION

SHELLFISHING IN BRITTANY

EFFECT OF TETRACYCLINES

2.1121

Seventy-seven meshes of single twine, followed by 13 meshes of double twine are braided from each selvedge, thus starting each wing. The top wings decrease from 90 meshes down to 11 meshes at the wing end. Batings are put in the fly mesh side of the wing causing that side of each wing to curve slightly. Sixteen batings are put in altogether, 6 in the double twine and 10 in the single. The fly-meshes and batings finish the double mesh after 7 meshes have been braided. After 58 meshes of the wing have been braided, a double row is worked across, single twine then continues until a 14-mesh width is reached where double twine completes the wing down to 11 meshes. There are 63 flymeshes in a top wing, a $5\frac{1}{2}$-inch mesh is used throughout and the length measured along the selvedge is $29\frac{1}{2}$ feet.

A belly is made in one piece and can be supplied to trawlers as such. In a complete trawl two bellies are used and known as "a pair of belly and batings." The construction of a belly is as follows: 200 meshes are set-up using double twine. Single twine is then used, and while braiding a $5\frac{1}{2}$-inch mesh, batings are put in each selvedge every fourth row until 18 batings have been put in altogether. This completes the "first spool". Proceeding with the second spool, a double row is braided first; then, using single twine and a $5\frac{1}{2}$-inch mesh, batings are put in every fourth row until 11 batings have been put in each selvedge. The third and last spool follows again with a double row, then single twine is used to the finish with a 5-inch mesh. Bating every third row until a width of 50 meshes is achieved, a single belly is then complete.

A description is also given of the construction of lengtheners and of the flapper.

3.12

tetracycline antibiotics ((2) and (3)), concentrations equivalent to 5 and 2 ppm respectively of the active materials were used.

The general procedure was to immerse the round fish in the various test solutions as soon after capture as possible. The fish in the first and third experiments were placed in the storage solutions immediately upon capture, whereas the fish used in the second experiment had been out of the water approximately 12 hours and were in rigor mortis when submerged in the storage solutions.

For the first and third experiments, sea water was used as the brine. In the second experiment, artificial brine was used. The containers used were paraffin-lined wooded barrels or galvanized metal cans filled with plastic bags. These containers were stored in a refrigerated room in which the temperature ranged from 0° to 4° C. All experiments were run in duplicate.

At intervals during the storage period, samples of 6 fish were removed from each container and graded organoleptically. The volatile acid number, trimethylamine, and volatile basic nitrogen content of each sample was determined on the comminuted flesh.

Results and summary. -- The conclusions reported are limited to the specific conditions of these investigations. The following observations were made: (1) the storage life of English sole in citric acid brine did not differ significantly from that stored in sea water; (2) the storage life of English sole in the experimental antibiotic brines was greater than that stored in brines without antibiotics; (3) when English sole were stored in experimental antibiotic solutions of equal molarity, the analyses of data from volatile base and trimethylamine did not demonstrate a significant difference in the rate of spoilage of the fish; (4) analyses of the data from volatile acid determinations indicated that solutions of tetracycline were less effective than equal molar solutions of either oxytetracycline or chlortetracycline; and (5) when English sole were stored in antibiotic solutions of equal weights of activity, the data from the chemical tests indicated that oxytetracycline solutions were more effective in extending the storage life than solutions of equal activity of either chlortetracycline or tetracycline. The analyses also showed no significant difference between the effects of the tetracycline and the chlortetracycline solutions.

2.02

Thus fish myoglobins proved to be fairly species-specific in respect to solubility, as well as to the other properties previously reported.

Table 1. Solubility constants (K_S' and β') of fish myoglobins and hemoglobins in phosphate buffer solution of pH 6.6 at 20° C., and their solubilities at $\gamma/2$ 6.0

Species and derivatives		K_S'	β'	Solubility (g./l.)*	Remarks
Parathynnus sibi	Myoglobin CO	1.76	10.8	1.62	
"	M myoglobin	1.76	10.8	1.91	
"	Myoglobin	1.81	11.0	1.52	
"	M myoglobin CN	1.76	10.8	1.62	
Makaira mitsukurii	Myoglobin CO	1.70	10.6	2.46	
Horse	"	2.03	14.4	148	Present data
Parathunnus sibi	Hemoglobin CO	2.33	12.8	0.059	
Thunnus orientalis†	"	2.08	10.7	0.105	
Makaira mitsukurii	"	2.05	10.4	0.012	
Bramidae sp.	"	1.85	10.0	0.071	
Horse	Hemoglobin CO	1.04	4.0	0.006	
Beef	"	1.82	10.2	0.182	Roche et al.
Human	"	2.33	12.5	0.036	(pH 6.50~6.55,
Rabbit	"	2.10	12.3	0.450	21~22° C.)

* Solubility in phosphate buffer solution of $\gamma/2.6$ and pH 6.6, at 20° C.
† Immature.

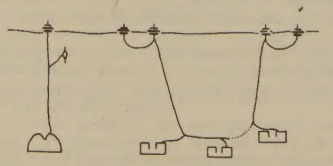
2.1474 (Cross Reference: 2.1128)

The lobster baskets are planted, singly or several in a row, at a depth of from 8 to 10 fathoms. The sunken baskets are secured lengthways to a main line about 30 feet away. The buoy lines are provided with two floats, both for easy finding, and at greater depths, to relieve the strain on the main buoy.

The pots are left in the water overnight and raised to the surface at sunrise. This must be done very carefully to make sure that the many lobsters clinging to the outside of the baskets are picked off before they drop back during the hoisting operation. Lobster, spiny lobster, and crab are caught in this way. After emptying, the pots are immediately hung with fresh bait and resunk.

Bait for catching large lobster is obtained from the sardine or tunny fisheries. Occasionally the fisherman may catch his own bait. For this purpose he has special creels which he baits with pieces of lobster.

Eight photographs of gear are included in this article.



2.113 SHIP MAINTENANCE AND REPAIR

Anonymous
The Shipping World and World Shipbuilding 134, No. 3274, 312 (March 29, 1956) (London, England)
World Fisheries Abstracts 8, 5-6 (January-February 1957)

Cathodic protection is defined as the use of an impressed current to prevent or reduce the rate of corrosion of a metal in an electrolyte by making the metal the cathode of the impressed current. The common method employed is by establishing a galvanic anode with a potential high enough and of large enough current capacity to neutralize all anodes on the metal to be protected. Magnesium of special composition is the normal material, and these anodes are used mainly for the protection of ballast tanks. A magnesium anode electrically contacted to steel in sea water will generate an electric current which will flow from the anode through the electrolyte to the steel and offset the weaker current produced by the corrosion of the unprotected steel. This results in the formation of a protective calcareous coating, which is evenly distributed over all members in a properly designed anode system. A special problem is that current requirements change rapidly with time after the application of a protective current. If current densities sufficiently high to effect immediate protection are applied, after a short time the applied current is greatly in excess of that actually required for protection. On the other hand, if current densities of the order of those required after equilibrium is established are applied initially, several years may elapse before complete control of corrosion is obtained. The steel surfaces of ballast tanks must therefore be polarized, either by an impressed current from a D. C. generator during the docking period, or by magnesium booster anodes. These booster anodes have a large surface area/weight ratio resulting in a high current output for a short time, usually 2 to 3 weeks. Metal and Pipeline Endurance Ltd. (MAPEL) have produced a finned type of magnesium anode which combines the functions of main and booster anodes, its initial large surface area producing a high current density which rapidly polarizes the surfaces of the tanks and forms the initial

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 ABSTRACTER: H. Maclear Bate

3.12 IMPROVED QUALITY OF FISH FILLETS AS A RESULT OF A FOOD GRADE OF CHLORTETRACYCLINE

Kline, E. F.; Abbey, A.; Darken, M. A.; Firman, M. C.; Kohler, A. R.; Miller, W. H.; Wiley, W. W.; Windland, H.; and Upham, S. (American Cyanamid Co., Food Industry Department, Princeton, New Jersey)
Antibiotics Annual 1956-1957, pp. 997-1001 (1957) Medical Encyclopedia Inc., New York, N. Y.

Because the function of the antibiotic, chlortetracycline (CTC) is primarily bacteriostatic, the greatest benefit from its use will result when used in combination with an effective sanitation program and good refrigeration on a freshly killed commodity.

Several experiments with CTC were run on red fish caught off the Grand Banks of Newfoundland. The fish were treated with the antibiotic in a dip prior to icing or with ice containing the antibiotic. In the first experiment, the fish (all obtained from a single drag) were divided into four groups and treated as follows: Sample 1 was held in regular ice to serve as a control. Sample 2 was placed in ice containing 5 ppm CTC. Sample 3 was dipped 5 minutes in a 25 ppm CTC sea-water solution and then stored in regular ice. Sample 4 was dipped for 5 minutes in a 25 ppm CTC sea-water solution and then stored in ice containing 5 ppm CTC.

The fish were graded at dockside

Table 1. Results with Four Samplings of Red Fish

Sample	Dip	Ice	Quality raw	Quality cooked	Grade standard
1	None	Regular	Good	Neutral, tasteless	No. 2
2	None	CTC*	Very good	Fresh, pleasant	1
3	25 ppm CTC	Regular	Very good	Fresh, pleasant	1
4	25 ppm CTC	CTC	Very good	Fresh, pleasant	1

* Chlortetracycline.

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 ABSTRACTER: Kathryn L. Osterhaug

3.17 EFFECTIVENESS OF ICE CONTAINING SODIUM NITRITE FOR FISH PRESERVATION

Tarr, H. L. A. and Sunderland, P. A. (Pacific Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada 5, 36-42 (May 1940)

The fact that nitrites are much more effective than benzoate for preserving both fresh and lightly smoked fillets suggested the possibility of employing ice containing nitrite to preserve dressed fish.

In preparing sodium nitrite ice, certain precautions must be taken in order to obtain a fairly uniform distribution of the salt throughout the ice. The water containing this salt should not be aerated or stirred during freezing, and the cores of the resulting ice blocks should not be "drawn" and refilled with water as is customary. When blocks of ice containing sodium nitrite are crushed preparatory to use, a fairly uniform distribution of the salt throughout the finely divided particles results.

Experimental. -- Ten fish-lots of halibut (Hippoglossus stenolepis), pink salmon (Onchorhynchus gorbuscha), and black cod (Anoplopoma fimbria) were dressed according to commercial practice and then iced. Five fish from each lot were iced with ordinary tap-water ice and the remaining five with ice containing 0.1 percent sodium nitrite. A second lot of twelve halibut was divided in two and six of the fish iced with tap-water ice; the remaining six were iced with 0.5 percent sodium nitrite ice. Individual fish from each of these lots were removed at intervals in order to determine the extent of spoilage.

Samples for determination of the viable bacterial population of the fish muscle were taken from the poke region in the case of halibut, and from one side of the fish in the case of pink salmon and black cod (sablefish). Organoleptic tests were made by the authors. These included the external

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 ABSTRACTER: Kathryn L. Osterhaug

3.19 RADIATION PRESERVATION OF FOOD

Panel on the Impact of the Peaceful Uses of Atomic Energy
Peaceful Uses of Atomic Energy 1, 69-74 (January 1956) United States Government Printing Office, Washington 25, D. C.

Experiments concerned with the consumption of foods preserved by radiation are being conducted under the direction of the Army Quartermaster Corps. The people in charge of this project hope that they will have accumulated enough experimental evidence, including tests of toxicity to humans, within 5 years to support the beginning of commercial application of radiation preservation.

Radiation sterilization can kill bacteria, but it does not inactivate enzymes in living food tissues. These enzymes, by continued action, cause changes in flavor and odor. Doses of radiation may range from large long-term preservative levels to small short-term pasteurizing levels. Off-flavors and off-odors tend to result from doses large enough to kill all bacteria present. Not all foods react alike to given doses and some foods appear to be better suited to this preservation technique than others.

The present experiments suggest that almost two dozen perishables can be successfully treated by radiation and stored for extended periods without refrigeration. Among these are breadstuffs, chicken, pork, and some vegetables. Milk, butter, and cream, on the other hand, are examples of foods which develop strong, objectionable odors upon radiation treatment.

Pasteurizing amounts of radiation inhibit bacterial growth and apparently lengthen the refrigerated shelf life of about 24 foods, without major changes in their flavor or odor. For example, mild irradiation may eventually extend the refrigerated shelf life of beefsteak, lamb, fish, and tomatoes

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 ABSTRACTER: Martin Heerdt

CATHODIC PROTECTION

CHLORTETRACYCLINE FOR FISH

SODIUM NITRITE ICE

STATUS OF FOOD IRRADIATION

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when they were 14 days out of the sea. The grading was based on an examination of the eyes, gills, color, texture and odor of the raw fish and upon the taste of the cooked fillets. The results are shown in table 1 (see over).

In the second experiment, freshly caught red fish from the Grand Banks were divided into six different groups. Sample 5 was iced with regular ice to act as a control. Sample 6 was stored in ice containing 5 ppm CTC. Sample 7 was dipped in sea water containing 25 ppm CTC for 5 minutes. Sample 8 was held in a similar solution for 60 minutes. Sample 9 was dipped in a 100 ppm CTC solution for 5 minutes and Sample 10 in the same solution for 60 minutes. All of these dipped samples were stored in ice containing 5 ppm CTC. The results of the organoleptic examination of these samples are given in table 3 (omitted). Results of standard microbial counts made on these samples are reported in table 4.

Table 4. Average Microbial Counts of Red Fish Treated with Chlortetracycline

Sample	Dip	Time min.	Ice	Microorganisms x 10^6/Gm. fish			
				11 days	14 days	18 days	21 days
5	None		Regular	1.5	34.0	107.0	196.0
6	None		CTC*	0.3	0.7	25.0	72.0
7	25 ppm	5	CTC	0.2	0.1	4.0	8.0
8	25 ppm	60	CTC	0.1	0.1	0.6	9.0
9	100 ppm	5	CTC	0.1	0.1	0.1	1.0
10	100 ppm	60	CTC	0.1	0.4	0.1	1.0

* Chlortetracycline.

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by as much as 5 to 10 times. Smaller-than-pasteurizing dosages hold promise for early application to the destruction of insects in stored grain and flour; the inhibition of sprouting of potatoes and onions; and the destruction of trichinosis parasites in pork.

Even if enough experimental evidence is accumulated within 5 years to establish the commercial feasibility of the process, an additional 3 to 10 years may have to elapse before the food-processing industry will be able to apply these new techniques on any substantial scale of production. Application also will be partially determined by the success of a pilot-scale operation scheduled for 1958 by the Department of the Army.

Both electrostatic machines and radioactive byproducts from nuclear reactors can be used to accomplish the actual preservation effect. Preliminary economic data are now being assembled on which to base forecasts regarding the exact types of commercial radiation-preservation equipment most likely to come into use. These data should be available by the end of 1956. No proven cost data will exist until the army pilot plant begins operation in 1958, therefore accurate estimates of costs cannot be made at the present time. Rough estimates suggest that the cost of irradiating foods will range from 0.3 cent to 10 cents per pound.

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calcareous deposit. The initial high current of the anode results in its rapid reduction in area by the sacrifice of the fin. Thereafter, the current output automatically reduces, remains constant and maintains the initial polarization and calcareous film.

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appearance of the iced fish, the odor of the poke, and the flavor of the cooked flesh. The amount of sodium nitrite in the treated fish muscle was determined by a method previously described by the authors.

Results and discussion.--Bacterial spoilage of the dressed halibut, pink salmon, and black cod was markedly inhibited by icing with crushed ice containing small amounts (0.1 or 0.5 percent) of sodium nitrite instead of ordinary tap-water ice. This was demonstrated by bacteriological examination and organoleptic tests. Halibut, however, does develop a marked yellow color on the ventral (white) side. No such obvious discoloration was noted in either of the other species when stored in nitrite ice.

2.15 RULES AND STANDARD PROCEDURES FOR FISH QUALITY IMPROVEMENT
RULES FOR TRAWLERS

Anonymous
Maine Coast Fisherman 11, 14 (March 1957)

Handling of fish. -- A. Fish must be gutted thoroughly, leaving no part of the gut (livers, etc.) to start spoilage.

B. All sizable fish must be gutted winter and summer.

C. Gutted fish must be washed thoroughly.

D. Water in washing box must be changed frequently--do not depend on the overflow.

E. Fish must be put down and out of the weather as quickly as possible.

F. Fish coming out of the hold must be sorted with care to cut down on number of culls.

Icing. -- A. Ice bed in pen must be at least six inches thick.

B. Jagged edges in crushed ice must be pounded out (the bottom fish carry the weight).

C. At least three inches of space must be left between fish, pen boards, and hull so that when you build up the ice will enter this area for proper keeping.

D. All layers of fish must be gauged to the size of the variety so that all fish get the benefit of ice.

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3.3343 EFFECT OF STORAGE ON DECOMPOSED CANNED SHRIMP

Barry, Helen C.; Weeks, John F., Jr.; and Duggan, R. E. (Food and Drug Administration, Department of Health, Education, and Welfare, New Orleans 16, Louisiana)
Journal of the Association of Official Agricultural Chemists 39, 801-805 (August 15, 1956)

Purpose. -- The present investigation was made with canned fresh shrimp that contained 10, 20, 50, or 100 percent decomposed shrimp to determine: (1) the effect of extended periods of storage on the organoleptic properties of canned shrimp, (2) the effect of extended periods of storage on the indole content of canned shrimp, and (3) the variation in indole content between individual cans of similar quality canned shrimp.

Experimental. -- Fresh shrimp from Louisiana waters were iced in layers to simulate commercial handling conditions and allowed to spoil in storage over a period of ten days. The spoiled shrimp then were carefully examined and graded organoleptically by analysts experienced in shrimp grading. Grades were assigned to the shrimp as follows: (1) passable: shrimp with fishy odors or other odors characteristic of commercial quality but not definitely identifiable as decomposed; (2) decomposed: shrimp in the first stage of definitely identifiable decomposition; (3) advanced decomposition: shrimp having an intense, persistent abnormal odor recognizable as being indicative of pronounced decomposition. Good quality commercial shrimp were mixed to contain 10, 20, 50, and 100 percent of grade 2 or grade 3 shrimp, and the mixtures were commercially canned and processed.

Examination. --At intervals of 1, 3, 7, 14, 30, 183, and 730 days four or more cans of each type were opened and submitted to an organoleptic panel for classification as either passable or decomposed according to odor without reference to intensity of odor. The panel varied in size from 5 to 14 participants experienced in grading raw shrimp for decomposition. Individual judgments on each can were recorded. The indole content of each can also was determined according to Official Methods of Analysis of the Association of Official Agricultural Chemists, 8th edition, sections 18.21 to 18.23.

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 ABSTRACTER: Martin Heerdt

3.231 SOLVING THE ARMY'S REFRIGERATION PROBLEMS

Fiske, David L.
Refrigerating Engineering 65, 45-48, 112-115 (April 1957)

Portable cold storage facilities. -- Sectional refrigerator boxes with electric-motor or gasoline engine-driven condensing-cooling units in ¼, ½, and 1 ton refrigeration capacities are now standard quartermaster equipment. Standardization has stabilized the dimensions of condensing-cooling units, boxes, flywheels, seal-housings, and bolt arrangements. Condensing units are powered by: (1) electric motors, (2) gasoline engines, or (3) combinations of a gasoline engine generator and an electric motor. Unit operation may be (1) stop-start or (2) continuous with two fixed speeds or variable speed (proportional control).

Korean War package unit. -- The most widely used field condensing-cooling unit in the Korean War was a 12,000 British thermal unit per hour (Btu/hr.) unit for insertion in the wall opening of a prefabricated refrigerator box. This unit was a complete machine mounted in an insulated panel which was part of the refrigerator wall.

Today's package units. -- The present day 1-ton capacity condenser-cooling unit has an 88 cubic foot gross volume, weighs 1350 pounds, and requires a 7½ horsepower electric motor or a 15 horsepower gasoline engine that is designed to maintain a refrigerated space at as low as 0° F. with outside temperatures at 110° F. Controls are provided for starting, temperature, safety, and defrosting. Each 1-ton capacity condensing-cooling unit is intended for holding 600 cubic feet of cold storage at 0° F., therefore an 1800 cubic foot box will require two or three units. In addition to the 1-ton unit, the quartermaster corps uses a ½-ton model of the 1-ton unit and a ¾-ton horizontal model for refrigerated truck trailers. Electric motors are preferred to gasoline engines, and more than half of the condensing-cooling units now in use are electric powered. If electric power is not available, gasoline

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 ABSTRACTER: Martin Heerdt

3.337 THE LABORATORY EXAMINATION OF CANNED FOODS.
XI. EQUILIBRIUM RELATIVE HUMIDITY

Kefford, J. F. (Division of Food Preservation and Transport, C.S.I.R.O., Homebush, N.S.W.)
Food Preservation Quarterly 17, 11-13 (March 1957)

Solids contents above certain limits, or conversely moisture contents below certain limits, are considered to inhibit microbial spoilage. Although it is true that microorganisms, as well as higher organisms, require water for growth, the fundamental index of the ability of a foodstuff to support their growth is not the water content but the "water activity". Water activity may be regarded broadly as a measure of the availability of water to the microorganisms.

Water activity. -- The water activity (A_W) of a food is defined by the expression: $A_W = p/p_o$, where p_o is the vapor pressure of pure water and p is the aqueous vapor pressure of the foodstuff at the same temperatures. Water activity varies with temperature but the variation is not important over the normal range of storage temperatures for foods.

The quantity, $p/p_o \times 100$, is the equilibrium relative humidity (ERH) of the foodstuff, and therefore water activity is numerically equal to equilibrium relative humidity expressed as a fraction, that is $A_W = ERH/100$. Water activity may be said to be a property of the food itself, whereas ERH is a property of the atmosphere immediately surrounding the food.

The minimum water activities at which various microorganisms are able to grow depend to some extent on the composition of the medium. It is, however, possible to state rough minimum limits. Most bacteria are inhibited at $A_W < 0.95$, and most yeasts at $A_W < 0.90$, although some osmophilic yeasts will grow at $A_W = 0.61$. Molds grow readily at $A_W = 0.75$ to 0.80. The significance of these limits is apparent when they are considered in relation to the water activities of some common foods, for instance, in fresh beef $A_W = 0.993$, in jams $A_W = 0.70$ to 0.83, in fruit cakes $A_W = 0.73$ to 0.85, and in dried milk $A_W = 0.2$ (approximately).

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 ABSTRACTER: Kathryn L. Osterhaug

3.231 (Cross Reference: 3.26)

engines are essential, and they present all of their own engineering problems as well as some of the problems encountered with the electric-powered units.

Today's prefabricated refrigerator boxes. -- The insulated prefabricated refrigerator boxes for the quartermaster corps are constructed in sections, each with a capacity of 600 cubic feet. To fabricate a refrigerator box requires the use of one or more 600-cubic foot sections. A box, therefore, may be enlarged or extended in one direction as far as desired.

Standardization. -- The goal of the standardization program is a single line of refrigerated boxes for all of the armed forces. These boxes will have common dimensions and interchangeable parts. Condensing-cooling unit models and sizes and refrigerator-box sizes should be of the minimum number needed to satisfy all branches. Most of the effort toward standardization is related to the condensing-cooling unit with the objective of reducing the variety of components and parts, particularly parts that wear out.

To date, condensing-cooling units have been standardized to a maximum of two compressors, either of which can be operated at two or more speeds. There are 2- and 4-cylinder compressors of either vertical or V form operating at a minimum of 1000 revolutions per minute. Condensing-unit capacity of the four-cylinder models is normally twice that of the two-cylinder models. Capacities are based on evaporator temperatures of 20° to 50° F. and condenser temperatures of 105° F. for water-cooled condensing units and 135° F. for air-cooled condensing units. Air-cooled condensing units carry a special rating for operation at a condenser temperature of 155° F.

3.337 (Cross Reference: 0.6)

Knowing the chemical composition of a food, it is possible to calculate its water activity, but a direct determination by measuring the ERH of the product is generally preferred.

Equilibrium relative humidity. -- From a practical viewpoint, the ERH of a food may be regarded as the humidity developed in a sealed vessel containing the food when the amount of free space is small, or, as the humidity of an atmosphere in which the food will neither take up nor lose water. These two concepts provide the bases for a variety of methods for the estimation of ERH.

The humidity of the atmosphere in equilibrium with a food may be determined by observing the dew-point, by absorbing the water vapor and measuring the change in volume, by the use of hygroscopic indicator salts, or by means of an electric or a lithium chloride hygrometer.

The alternative approach is to measure the weight changes that occur in samples of foodstuff held in atmospheres of known humidity. Several methods based on this principle are being used in various laboratories.

In the method of Hicks (1944), three screw-top jars are used as constant-humidity chambers, each containing approximately 1 inch of a sulfuric acid solution of known equilibrium humidity. For instance, in a determination on a product thought to have ERH in the order of 75 percent, the jars might contain sulfuric acid solutions giving relative humidities of 80, 75, and 70 percent respectively.

Two to five grams of the test product are weighed accurately into three standard-sized dishes, each of which is placed in a glass support above the acid in one of the jars. The jars are sealed and held at a constant temperature, and the dishes are reweighed at intervals.

It is not necessary to wait for the samples to reach equilibrium. A good estimate can be obtained by plotting the total weight change of each sample after two days against the relative humidity of the storage atmosphere.

Both positive and negative weight changes are observed. A curve is then drawn through the three points and the humidity corresponding to zero weight change on the curve is taken as the ERH.

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E. Never neglect to shelve fish. Protect your investment in labor of catching and handling by relieving pressure.

F. Plenty of ice must be used at all times. Ice is cheaper than fish. Protect against breakdown, bad weather, and accident or sickness.

Sanitation. -- A. The hold must be dried out and painted thoroughly at least once a year.

B. The hold must be washed completely after the discharge of each trip. After thorough washing, sprinkle the entire area with salt or any other similar agent.

C. Pen boards must be washed and scrubbed immediately after they come out of the hold. Keep pen boards painted, replace worn or beat-up boards immediately.

D. Working tools, which come in contact with fish, must be kept clean and free of rust.

E. Culls must be handled quickly when discharging trip. Do not throw them back on deck. Place them immediately in iced container on the deck.

F. Facilities provided for personal cleanliness must be used.

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Results. -- Shrimp that was of passable quality when canned gradually acquired an aromatic stale odor in storage. Canned mixtures of fresh and decomposed shrimp did not possess the sharp gradation in intensity of odors that characterized canned passable quality shrimp held from 1 to 183 days. Analysts found difficulty in judging 100 percent decomposed shrimp as decomposed after 730 days of storage. Canned shrimp with intense odors of decomposition gave high indole values. One can of grade 3 shrimp with an indole content of 215 millimicrograms ($m\gamma$) per 100 grams was condemned unhesitatingly by the panel, whereas a can of shrimp containing 10 percent of grade 3 shrimp with an indole content of only 23 $m\gamma$ per 100 grams was passed by six of the same ten panel members.

Canned grade 2 and grade 3 shrimp after only a short time in storage became soft and yellow-brown in color. Softness was also found in combinations of passable and decomposed shrimp, but the color remained bright orange-red throughout the 730-day period of storage. This color change cannot be used to separate a canned mixture of decomposed and passable shrimp.

Average indole values tended to decrease as the period of storage increased, but no cans of shrimp were found in which the indole had disappeared entirely from the decomposed shrimp. Combinations of canned passable and decomposed shrimp lost from 39 to 92 percent indole during 730 days of storage. In contrast, the indole content of passable shrimp did not show a loss and averaged 2 $m\gamma$ per 100 grams after one day of storage and 2 $m\gamma$ per 100 grams after 730 days storage. The majority of the panel were able to recognize canned shrimp as decomposed only when 20 percent grade 2 shrimp or 10 percent grade 3 shrimp were present.

2.2 RULES AND STANDARD PROCEDURES FOR FISH QUALITY IMPROVEMENT
RULES FOR WHOLESALERS

Anonymous
Maine Coast Fisherman 11, 14,(March 1957)

Removal of fish from boats. -- A. Conveyances (carts, boxes, trucks, etc.) must be in a clean and sanitary condition before receiving fish.

B. Conveyances must never be overloaded.

C. Covers must be provided for use on all conveyances and covers must be used immediately the conveyance is loaded regardless of location.

D. Fish stored in conveyances, or stored in areas awaiting handling, must be iced at all times.

E. Fish that have been iced awaiting handling must be inspected periodically for ice renewal when needed.

Plant procedure. -- A. Forks and hooks used in direct handling of fish must be abolished wherever possible.

B. Containers used for shipment of fresh fish must be clean and new.

C. The practice of returning packages (barrels, boxes, etc.) for credit or RE-USE must be abolished entirely except in the case of tight containers where fish are floated.

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3.338 IRON SULFIDE DISCOLORATION OF TUNA CANS NO. 5
EFFECT OF SALT, OIL, AND MISCELLANEOUS ADDITIVES

Pigott, George M. and Stansby, M. E. (Northwest Branch, National Canners Association, Seattle, and Fishery Technological Laboratory, Seattle, Washington, respectively)
Commercial Fisheries Review 19, 7-9 (February 1957)

This is the fifth in a series of six papers reporting the findings of an investigation into the factors associated with iron sulfide formation in tuna cans. This report is concerned with the effects of various additives on iron sulfide discoloration.

Effect of salt and oil. -- Approximately 1/8 ounce of salt and from 1 to 1½ ounces of vegetable oil are added to each can (½ can) of tuna before it is seamed and retorted. A series of experiments were carried out to investigate the effect of salt and oil on can discoloration and to determine whether different batches of salt or oil affect the formation of discoloration in different ways.

Rock salt and table salt from several commercial sources were used (1) in solid packs of yellowfin tuna that normally formed discoloration in single-enamel cans and (2) in similar packs of albacore that did not normally form the discoloration. Neither the amount nor the source of salt had any effect upon the extent of can discoloration in these studies. However, when no salt was added to the yellowfin pack with added vegetable oil, no discoloration was found.

Vegetable oils obtained from several tuna packers were found to have no effect on can discoloration in the same lots of tuna used in the salt source studies. The oils were also analyzed for free fatty acid content both before and after heat processing. No increase in free fatty acid content was found after the oils were processed 75 minutes at 240° F. The oils from discolored and from normal packs of tuna were also analyzed for free fatty acid. The results showed no important differences in the free fatty acid content of normal, spoiled, and sulfide discolored packs.

The yellowfin that normally caused can discoloration was packed using various combinations of

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ABSTRACTER: Kathryn L. Osterhaug

3.337 NATURE OF GREEN OR OFFCOLOR CONDITION IN PRECOOKED YELLOWFIN TUNA

Naughton, John J.; Frodyma, Michael M.; and Zeitlin, Harry (Chemistry Department, University of Hawaii)
Special Scientific Report: Fisheries No. 197, 7 pp. (December 1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

The color of food is an important factor governing acceptance or rejection by the processor as well as by the consumer. An interesting example of this is the "greening" of the flesh of certain tuna that becomes evident on precooking prior to canning. This problem has been found to be particularly serious with the large deep-swimming yellowfin tuna, Neothunnus macropterus, that are caught on long-line gear in the central Pacific Ocean.

The Japanese have long recognized the problem and have given some study to its cause. Recently, certain Japanese investigators have reported a correlation between the greening of tuna and the concentration of a flesh pigment spectrophotometrically identified by them as myoglobin. They also claim to be able to predict the occurrence of greening with 85 percent certainty by visual examination of the raw meat.

This report summarizes the conclusions reached as a result of a preliminary investigation on this problem conducted at the University of Hawaii under contract with the United States Fish and Wildlife Service.

In order to establish an objective standard for the normal color of acceptable or desireable precooked tuna meat, the reflectance of precooked meat judged to be a good quality was measured over

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ABSTRACTER: Kathryn L. Osterhaug

4.13 FISH OILS VIII. THE APPROXIMATE COMPOSITION OF THE FATTY ACIDS OF THE OIL OF PILCHARDS (SARDINOPS CAERULEA)

Brocklesby, H. N. and Harding, K. F. (Pacific Fisheries Experimental Station)
Journal of the Fisheries Research Board of Canada 4, 59-62 (April 1938)

During the ten years preceding 1938, California pilchard oil assumed an important position in the fishing industry of British Columbia. Technical researches during this period concerning the properties and commercial uses of this oil uncovered considerable information regarding the fatty acid composition of pilchard oil. The present paper reports a complete analysis of these acids by the methyl ester fractionation method.

The composition of pilchard oil fatty acids, as found in a sample produced commercially during July 1935 from whole pilchards, is shown in table 1 (see over). The analytical characteristics of the pilchard oil used were as follows: iodine value, 183.9; saponification value, 198.8; and refractive index at 25° C., 1.4794.

In table 1 the figures under solid acids "S" refer to the fatty acids whose lead salts are insoluble in 95 percent ethyl alcohol at room temperature. The liquid unsaturated acids "U", and the liquid highly unsaturated acids "HU" refer to the acids whose lithium salts are respectively insoluble and soluble in 95 percent acetone. An inspection of the data shows that approximately 23 percent of the total fatty acids are saturated and that palmitic acid is present in considerable excess over myristic and stearic.

As previously reported by one of the authors, the characteristics of pilchard oil undergo considerable seasonal changes. The authors planned to follow these changes by methyl ester fractionation.

A description of the experimental procedure used is included in this paper.

See table 1, over.

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ABSTRACTER: Kathryn L. Osterhaug

3.337

the visible range of wave lengths of light (400 to 700 millimicrons) using the Beckman DU spectrophotometer. Samples judged by experts to be green were then prepared and measured in a similar manner. Curves were made and compared from the data accumulated in each of these series of readings.

Preliminary results from the analytical use of spectral reflectance in the study of the "greening" conditions in precooked yellowfin tuna indicate that it is possible to predict tendency to greening from laboratory precooking. It appears that color changes in tuna are the results of oxidative changes in the hemoglobin and myoglobin pigments of the flesh, and that differences in color, including greening, result from differences in the concentration of these pigment derivatives. A relatively higher concentration of methemoglobin or metmyoglobin in raw fish flesh seems to be indicative of a tendency to greening on precooking.

Table 1.--Types and relative heme pigment content in raw and cooked tuna. Basic heme pigment is assumed to be myoglobin.

	Oxy-myoglobin	Met-myoglobin	Denaturated globin	
			hemichrome	hemochrome
	Raw Tuna		Cooked Tuna	
Normal	+ +	+	+	+ +
Green	+ +	+ +	+ +	+ +

+ = low concentration
+ + = higher concentration

4.13. (Cross Reference: 1.24, 4.11)

Table 1. Approximate composition of Canadian pilchard oil fatty acids.

Acids	Solid acids "S" %	Liquid unsat'd acids, "U" %	Liquid highly unsat'd acids "HU" %	Total %	Neut. equiv. of acids	Unsaturation as -H per mole
Saturated						
Myristic (C_{14})	4.91	0.18		5.09	228.2	
Palmitic (C_{16})	13.90	0.48		14.38	256.3	
Stearic (C_{18})	3.19			3.19	284.3	
Unsaturated						
C_{14}		0.07		0.07	226.2	2.00
C_{16}	3.05	8.69		11.74	254.3	2.00
C_{18}	2.20	13.73	1.74	17.67	281.1	3.29
C_{20}	1.24	5.83	10.81	17.88	308.3	4.12
C_{22}			13.80	13.80	332.0	8.47
C_{24}			15.24	15.24	357.6	10.90

2.2

D. Fish (fillets, etc.) that are awaiting handling (to and at freezer) must be racked to relieve pressure and, if possible, racks that require no additional handling.

E. Fillets (etc.) in a fresh condition, that are to be transferred from one place to another for any reason whatsoever, must be carried in containers provided for the purpose. Each container to be covered and iced regardless of destination.

Sanitation.--A. Carts, boxes, and conveyances of any kind must be washed thoroughly, immediately after they become empty of fish.

B. Plant and equipment must be subject to constant washing down when plant (or store) is in operation.

C. Responsibility for plant cleanliness must be specifically assigned to a person (or persons).

D. Exterminators (individuals or firms) must be employed for the control of rodents, vermin, flies, etc.

E. Fish operations (filleting, cutting, etc.) practiced in the open must be abolished. Proper cover and facilities for cleanliness must be available.

F. Clothing of all personnel must be kept in a clean condition consistent with the requirements demanded in the handling of food.

G. Smoking in filleting rooms and wrapping rooms--on lines, tables or benches used for processing--must be abolished.

3.338 (Cross Reference: 3.331)

soya oil, saturated brine (room temperture), and salt. Whenever both salt and free oil, or salt and free water, or free water alone were present in the canned product, can discoloration appeared. However, if no free liquid was present, no iron sulfide was formed. Thus, free liquid seems to be necessary before can discoloration will occur.

Effect of miscellaneous additives.--Fish that had a history of causing can discoloration as well as those that had never caused discoloration were packed with and without various additives. The additives included free fatty acids, trimethylamine, trimethylamine oxide, glycerine, tartaric acid, sucrose, glucose, and monosodium glutamate. None of these was found to foster or hinder the development of can discoloration to any extent.

Cuprous and cupric salts, when added to the experimental packs, caused can corrosion, but not iron sulfide discoloration.

(This investigation was jointly sponsored by the Continental Can Company and the U. S. Fish and Wildlife Service).

Table 2. Free Fatty Acid Content of Oil from Canned Tuna

Source of Oil	Free Fatty Acid Content
	Percent 1/
Packs from normal tuna	0.101 to 0.272
Packs from badly spoiled fish	0.343 to 0.372
Discolored commercial packs	0.129 to 0.486

1/ Calculated as oleic acid.

Table 3. Effect of Oil and Salt on Can Discoloration in Solid Pack Tuna 1/ 2/

Additives			
Soya Oil	Saturated Brine	Salt	Discoloration
. . . . .	.(Ounces).	. . . . .	(Degree) .
$1\frac{1}{2}$	0	1/8	Medium
$1\frac{1}{2}$	0	0	None
0	$1\frac{1}{2}$	0	Heavy
0	0	0	Medium 3/
0	0	1/8	Medium 3/
0	0	0	None 4/
0	0	1/8	None 4/

1/ All packs were processed for 75 minutes at 242° F.
2/ Cumulative results of 3 experiments of 96 cans each. Total of 288 cans approximately evenly divided into the 7 groups.
3/ Considerable free water was present after retorting.
4/ No free water was present after retorting.

2.41 FISH BOXES AND CONTAINERS

Cutting, C. L.; Nicol, D. L.; Spencer, R.; Paine, F. A.; and Watkinson, D.
The Fishing News Part 1, No. 2251, 7 (June 1956) (London, England)
World Fisheries Abstracts 8, 21-22 (January-February 1957)

This paper opens with a survey of the problems and particularly the cost of fish boxes in the United Kingdom and describes various experiments made in connection with a search for a strong, well insulated, easily cleanable fish container, and concludes that the answer to many problems would be a cheap, non-returnable box that could be disposed of after one journey. Standardized cycles of drop tests to compare strength showed that some patterns of 6 stone (84 lb. or 38.1 kg.) capacity, returnable, wooden boxes in common use were markedly superior to others. The type most resistant to bad treatment consisted of a wooden crate with an aluminum liner, and it is suggested that the reasons are that the liner prevents fish from finding and opening up small cracks in the timber and that the crate-type of construction provides a more elastic framework, which resists shocks better than a more rigid box, while the type of closure employed confers additional strength.

Boxes made of expanded polyvinylchloride ("p.v.c.") and polyester were shown to be unsatisfactory. The performance of ordinary wooden boxes was shown to be much improved by strapping with steel bands and it is also concluded that they would be strengthened if more steel straps were used in manufacture. When non-returnable 1 stone (14 lb. or 6.35 kg.) fillet boxes were similary tested, corrugated fiberboard was shown to be quite unsatisfactory, but a molded resin impregnated pulp was distinctly promising.

A study of heat insulation of various boxes as measured by ice melted under conditions comparable with normal transport showed that an all-aluminum box is unsatisfactory except under special

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 ABSTRACTER: C. L. Cutting

4.64 32 SPICES GAGED AS ANTIOXIDANTS

Chipault, J. R. (Hormel Institute, University of Minnesota, Austin)
Food Engineering 29, 134-137 (April 1957)

Within the past four years at Hormel Institute, the author has evaluated the antioxidant properties of 32 common spices in 78 samples of lard and in fat-containing foods, such as ground pork, mayonnaise, french dressing, and pie crust. In these samples the effectiveness of each spice was expressed as an antioxidant index or ratio of the keeping time of the treated sample divided by the keeping time of the control sample. Index values above 1 indicated antioxidant activity, whereas values below 1 indicated prooxidant activity. A value of 1, therefore, indicated no antioxidant activity.

In lard.--Ground spices were added to lard at a concentration of 0.2 percent, and fat stability was determined by the active oxygen method. In these tests lard was used as a substrate simply to provide a rigid screening method to quickly classify the spices. Of the 32 spices tested in lard, only a single sample of ginger was found to be slightly prooxidant. Three other samples had slight antioxidant activities. In most cases the difference between the antioxidant indices of various samples of the same species was very small.

Twenty-one of the spices were weak antioxidants; they increased the keeping time of lard by less than 100 percent. Rosemary and sage were powerful antioxidants; they extended keeping time of lard many fold.

Soluble fraction studies.--Soluble fractions of the spices were obtained by extraction with petroleum ether and 95 percent ethyl alcohol. These fractions then were evaluated for their antioxidant index. In only chili, cloves, and thyme was the activity of the soluble fractions slightly greater than

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 ABSTRACTER: Martin Heerdt

4.64 HEATING OF MENHADEN SCRAP REDUCED BY ANTIOXIDANT IN TEST

Anonymous
Feedstuffs 29, 14 (April 6, 1957)

Antioxidants were used recently at Morehead, City, North Carolina, to reduce the heating of menhaden scrap after it had been dried. This use of antioxidants may make fish meal a more stable and more easily handled source of protein.

In this study, butylated hydroxytoluene (BHT) was added to menhaden scrap in the form of a fish oil solution at the rate of 2 pounds of BHT per ton of scrap immediately after the scrap left the dryer. This is equivalent to the addition of BHT at the rate of 1 percent of the oil content of the scrap.

Three-ton experimental piles of BHT-treated dried menhaden scrap reached temperatures of 115° and 117° F. respectively, within 15 and 40 hours after discharge from the dryer. In contrast, 3-ton control piles of dried menhaden scrap reached a temperature of 208° F. within 15 hours after discharge from the dryer and had to be turned to prevent combustion. The control piles remained well above temperature limits during the time that they were most vulnerable to rapid oxidation.

Less satisfactory results were obtained if the antioxidant was added at the same rate but during other stages of processing. BHT-treated fish scrap bagged immediately after drying reached a temperature of 109° after 18 hours, whereas untreated scrap bagged immediately after drying reached 147° F. after 18 hours.

 ABSTRACTER: Martin Heerdt

4.86 PLASTIC REPLACES WOOD FOR STORAGE AND PROCESSING OF FISH OILS

Anonymous
Fishing Gazette 74, 104 (April 1957)

Plastic tanks are being used to replace those made of wood in the compounding of fish oils for leather processing in a plant in Salem, Massachusetts.

In producing the final blends of leather processing oils a variety of acid and alkali greases are used. Dilute (up to 10 percent) solutions of sulphuric, nitric, and hydrochloric acids are used in the treatment of both animal and vegetable oils that are incorporated into the blends.

Wooden tanks were previously used for the storage and processing of these corrosive compounds. However, wooden tanks are almost impossible to keep watertight if they are allowed to dry out between fillings because salt deposits gradually build up between the joints.

The plastic tanks being used to replace the wooden ones are of asbestos reinforced phenolic resin and glass reinforced polyester. They are used to handle acid and alkali greases at temperatures of from 65° F. to 165° F. and at pH ranges of from 1.5 to 6. Alkaline solutions are also used on occasion.

No crystallization damage has been noted with the plastic tanks; maintenance has been virtually eliminated; and service life has been extended. Repairs, if they should become necessary, can be made by the use of patching resins and catalysts which are available in kit form.

 ABSTRACTER: Kathryn L. Osterhaug

RESEARCH ON FISH BOXES

ANTIOXIDANT FOR FISH MEAL

SPICES AS ANTIOXIDANTS

FISH OIL PROCESSING

4.64

4.86

2.41

conditions and that a liner crate was somewhat poorer than a wooden box, while the highly expanded "p.v.c." was not particularly remarkable, which is explained by reference to "film coefficients." In any case, it is pointed out that heat leakage through the best boxes during actual transport only accounts for about one-seventh of the total ice meltage under representative U.K. conditions. A bacteriological study of the problems of washing wooden fish boxes has shown that hosing with cold water is comparatively ineffective. The use of certain disinfectants and particularly scrubbing, markedly reduce bacterial load, plastic-coated being the best. Although aluminum surfaces are, no doubt, easier to clean, corrosion and maggot infestation through the drainage holes are disadvantages.

4.64

that of the ground spice. Of the remaining fractions, seventeen were equal to the ground spice in antioxidant activity and twelve were actually prooxidants.

In baked goods. -- To determine the antioxidant carry-through of these spices into baked goods, the stability of pie crust-type pastries made with lard having the spice added were tested. Cardamon, coriander, cumin, dill, fennel, and foenugreek performed consistently as prooxidants in pie crusts. In contrast, oregano, rosemary, sage, and thyme performed as antioxidants and improved pie crust stability appreciably. Rosemary appeared to be more resistant to baking than sage and oregano had approximately the same antioxidant power in pie crust as in lard.

In emulsions. -- Various spices also were tested in simple oil-water emulsions made with corn oil from which the natural antioxidants had been removed. All of the spices except sage and rosemary were much better antioxidants in the oil and water emulsion than in lard. The best spice for use as an antioxidant in emulsions was cloves which increased fat stability about 86 times. After cloves, in order of decreasing effectiveness, were turmeric, allspice,, mace, and rosemary. Other spices which were practically ineffective in lard and quite effective in the oil and water emulsion were cassia, cinnamon, allspice, cardamon, ginger, black pepper, white pepper, and savory, all of which had antioxidant values of at least 5.

In pork. -- Allspice, cloves, rosemary, and sage were outstanding as antioxidants in ground pork. Pork samples remained without rancidity for 36 weeks at 23° F. or 96 weeks at 5° F. Samples of ground pork that contained cloves showed very little oxidation when peroxides were determined.

In mayonnaise. -- The most effective spice in mayonnaise was oregano, which had an antioxidant value of about 8.5. Cloves, rosemary, sage and thyme doubled mayonnaise stability. In french dressing, the rate of rancidity development was halved by cloves, oregano, and sage only. None of the other spices were effective.

6.195 AMINO ACIDS DON'T ALWAYS HELP PROTEIN UTILIZATION: PROPER BALANCE IS THE KEY

Anonymous
Chemical and Engineering News 35, 32, 34 (April 29, 1957)

In tests with young rats, P. D. Deshpande and Conrad A. Elvehjem of the University of Wisconsin showed that both methionine and phenylalanine, which are essential to nutrition, must be in proper balance with other amino acids in the diet.

Deshpande explained to the Federation of American Societies for Experimental Biology, which met in Chicago, (1) that workers in nutrition should look for better ways of supplementing diets with amino acids, (2) that to obtain a balanced diet is not merely a matter of adding a few missing ingredients, and (3) that the action of each substance must be studied to learn how it performs alone and in the presence of other substances.

According to Deshpande and Elvehjem, methionine and phenylalanine must be in balance with at least four other amino acids to be most effective. If any of these six amino acids are absent, maximum growth will not be obtainable.

Young rats used in the study received a diet that contained 6 percent beef blood fibrin as a source of protein. This quantity of fibrin is less than half of their normal requirements.

Without amino acids as a supplement to the diet, the rats gained in weight at the rate of 14.2 grams every 14 days. With phenylalanine as a supplement to the diet, the rats gained at the rate of 12.1 grams every 14 days. If phenylalanine was replaced with methionine, the rats gained at the rate of

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 ABSTRACTER: Martin Heerdt

6.37 THE UNIVERSALLY WELL-FED FUTURE

Anonymous (Dodge and Olcott, Inc., 180 Varick St., New York 14, N. Y.)
The Changing World of Food, pp. 33-36 (January 1957)

Algae, the most primitive of plants, have no roots or stems, and many species float free. The Chlorella are single cells, invisible to the eye. They live both in fresh and in salt water and serve as food supply for other microscopic life and for such marine animals as shrimp, oysters, and fish. Each cell produces protein, fat, carbohydrates, and other food fractions. At least 50 percent of its dry weight is protein, which classes it with meat and fish in this constituent. It reproduces by cell division--as often as twice a day.

Dr. A. W. Fisher, Jr., of Arthur D. Little Co. directed a pilot-plant study of algae culture in which 80 pounds of dry algae were produced. On the basis of his experiments, a hypothetical plant could yield 6 tons of algae per day at a cost of 25 cents per pound.

Theoretically, 55,000 pounds of protein can be harvested from an acre of Chlorella--more than 60 times the annual output of an acre of soybeans.

At least two American patents exist in this field: 2,732,661 and 2,732,662 (both to Carnegie Institute of Washington, D. C.). One process involves the cultivation of the one-cell algae in a nutrient medium in the presence of light and a sufficient supply of carbon dioxide. The nutrient medium consists of an aqueous solution of fixed nitrogen and inorganic mineral nutrients and trace amounts of micronutrients. The second patent is based on the discovery that growth of the algae is affected by the dimensions of the container in which the cells are grown.

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 ABSTRACTER: F. Bruce Sanford

6.195 THE ADDITION OF SMALL AMOUNTS OF DEFATTED FISH FLOUR TO MILLED WHEAT FLOUR, CORN MEAL AND RICE

Sure, Barnett (University of Arkansas, Vayetteville)
The Journal of Nutrition 61, 547-554 (April 10, 1957)

Purpose. -- This study was made to investigate the influence of small amounts of fish flour as supplements to the proteins in enriched, milled wheat flour, white corn meal, and polished rice.

Materials used. -- For a preliminary study, non-defatted fish flour from Valparaiso, Chile was used. This flour, which contained 9.9 percent fat, had poor keeping qualities and became rancid in warm weather; however, the encouraging results obtained with it warranted a further study with defatted fish flour. The defatted flour used for this study came from a mixture of carp, smelt, and whiting that was extracted with ethylene dichloride and dehydrated under atmospheric pressure at 71° C. by the process of Levin (1952) and Levin and Finn (1955). The finished defatted fish flour contained 78 percent protein, 0.4 percent fat, 4.6 percent water, and 16.9 percent minerals.

Experimental. --Wistar strain albino rats, 28 days old and weighing 50 to 53 grams each (12 animals per group), were fed for 10 weeks on either a wheat or a rice basal ration or for 6 weeks on a corn basal ration. Rats were weighed weekly and food consumption was recorded. The basal rations contained enough milled grain to provide 8 percent protein from milled wheat flour, 6 percent protein from corn meal, and 5 percent protein from polished rice. Fish flour as a supplement was supplied at levels of 1, 3, and 5 percent of the ration at the expense of the milled grain. Rations contained in addition, 2 percent celluflour, 4 percent Sure's salts No. 1 (1941), 7 percent vegetable shortening, 2 percent cod liver oil, 1 percent wheat germ oil, and glucose to make a total of 100 percent. An abundance of the B vitamins was provided in all rations. Cod liver oil and wheat germ

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 ABSTRACTER: Martin Heerdt

7.89 REPORT ON DECOMPOSITION IN FISH (HISTAMINE)

Williams, David W. (Food and Drug Administration, Department of Health, Education, and Welfare, San Francisco 2, California)
Journal of the Association of Official Agricultural Chemists 40, 420-422 (May 15, 1957)

Introduction. --Subcommittee C recommended that chemical methods be studied for the determination of histamine[1] in fish products. The Associate Referee made a limited comparison of the biological method for histamine with a chemical method predicated on previously reported chemical methods for histamine in biological materials.

Chemical method. --In this chemical method the ground, drained fish is heated with a solution of trichloroacetic acid and the mixture is extracted with ethyl ether to remove the trichloroacetic acid and other ether extractives. The water phase is then extracted with n-butanol in the presence of NaOH and a Na_2SO_4—$Na_3PO_4 \cdot H_2O$ salt mixture. The butanol extract is diluted with petroleum ether and the histamine is extracted with normal H_2SO_4. The sulfuric acid extract is made alkaline with solid Na_2CO_3 and boiled to remove volatile alkaline components. After deaminization with $NaNO_2$ in acid solution, the color is developed with diazotized p-nitroaniline in a solution buffered at pH 8.2. Absorbance of the color of a methyl isobutyl ketone extract is read at 525 mμ on a spectrophotometer or in a neutral wedge photometer with a No. 52 filter.

Comments on the chemical method. -- In the extraction of histamine in alkaline solution, one extraction in the ratio of 1:1 butanol to water solution removed from 86 to 89 percent of the histamine. Because of the mechanical difficulties of multiple extraction, only one extraction was used and a correction was made. Also, because butanol increases in volume during the extraction, and saturated butanol did not prove an effective solvent, the volume had to be measured and a correction made. The volume increase was found to be uniform for a particular reagent but varied from 6 to 18 percent over the range of reagents used. The percentage of extracted histamine was increased to 93 to 97

[1] The term "histamine" is used throughout this report to denote histamine-like substances.

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 Reprinted in part

AMINO ACID IMBALANCE

PROTEIN VALUE OF FISH FLOUR

ALGAE CULTURE

ASSAY FOR HISTAMINE IN FISH

6.195

oil used in the rations provided fat soluble vitamins A, D, and E. Results of this study were expressed as gains in rat body weight per gram of protein intake.

Results. -- On the enriched milled wheat flour ration, supplementation with 3 percent fish flour resulted in optimum protein efficiency; however, maximum growth or a 7-fold increase in rat body weight was secured only by supplementation of the ration with 5 percent fish flour. Small gains in body weight were obtained on the basal corn meal ration. The addition of 5 percent fish flour to the corn meal ration increased growth 15 fold.

The supplementation of the polished rice ration with 1 percent fish flour produced optimum protein efficiency. Supplementation of the rice ration with 3 and 5 percent fish flour produced a further increase in growth. Supplementation of the rice ration with 5 percent fish flour produced rat weight gains of somewhat more than $3\frac{1}{2}$ times those obtained with the basal ration.

Summary. -- Fish flour has a very high protein content and a high biological value, whereas the proteins in soybean and peanut meals at low levels of protein intake have low biological values. Benefits obtained from the addition of small amounts of fish flour to the proteins in milled cereal grains also may be due in part to their vitamin B_{12}. The enormous gains in rat body weight and in protein efficiency obtained in this study were far greater than those secured in the past with dried nonfat milk solids, dried butter-milk, defatted soybean flour, brewers' yeast, cultured food yeasts, and peanut meal. Results like these may prove of value in combatting protein deficiences such as kwashiorkor which is prevalent in infants and young children in Asia, Africa, and Latin American countries. Suitable clinical trials with humans should be initiated.

7.89

percent by precipitating the histamine with 20 percent phosphotungstic acid. The water was then removed by centrifuging and decantation, and the precipitate was dissolved in 40 percent NaOH in the presence of anhydrous Na_2SO_4 before extraction with butanol. This procedure seemed to be better than extraction from a water solution, particularly for removing impurities. Only a few experiments were attempted; a pure solution and one fish sample were used.

Experimental data. -- The chemical method was compared with the biological method on two samples of fish from the lot used in collaborative studies of the biological method last year. The milligrams (mg.) of histamine found per 100 grams of sample C were 4.7, 4.4, and 4.5 mg. by chemical assay and 3, 3, 3, and 2 mg. by biological assay. Values found for sample D were 15.5 and 16.1 mg. by chemical assay and 15, 14.5, and 17.5 by biological assay.

Known amounts of histamine diphosphate equivalent to histamine were added to six portions of Sample C fish and the portions were analyzed by the chemical procedure. Results are shown in table 1, below.

Discussion and recommendations. --Preliminary work indicated that the histamine-like substances measured by the biological method and calculated as histamine approximate the histamine determined by the outlined chemical method. It is recommended that the study of chemical methods for histamine as an index of decomposition in fish be continued and that further collaborative studies of the biological method for histamine-like substances be made.

Table 1. Determination of histamine in fish by chemical method.

Sample	Histamine added, mg./100 g.	Histamine found, mg./100 g.	Recovery, %[a]
1	None	4.5	- -
2	None	4.5	- -
3	7.3	11.7	99.5
4	14.5	19.4	102.2
5	21.8	26.9	102.3
6	29.0	32.9	98.1

[a] Correcting for efficiency of one butanol extraction (86%) and volume increase of butanol of 18%.

6.195

9.6 grams every 14 days. If both phenylalanine and methionine were included as supplements to the diet, the rats gained at the rate of 5.6 grams every 14 days.

If phenylalanine, methionine, histidine, leucine, isoleucine, and valine were included as supplements to the diet, protein imbalance was corrected and the rats gained in weight at a rate of more than double the original rate of growth. If methionine was omitted, and the other five amino acids were included as supplements, the rats gained in weight at only slightly more than the original rate of growth.

6.37

Drs. H. B. Gotaas and W. J. Oswald of the University of California suggest that ponds in which sewage is decomposed could be converted to algae farms. Research on a small pond indicates that 1 to 2 days are required for sewage decomposition and that 1,000,000 gallons of sewage would yield 1,000 pounds of dry algae.

Dr. B. R. Mead of the University of California uses a rooftop for a different type of farming in which a U-shaped trough is employed. Sea water may prove a good medium since most of the necessary chemicals are present.

Uses. -- Dried algal oils burn with a slow, hot flame. They also are rich and cheap potential sources of animal foods and of industrial and pharmaceutical products such as antibiotics and emulsifiers. The Navy is interested in possible use to remove carbon dioxide and to supply oxygen as in a submarine. It may make bread more nourishing by supplying the amino acids, lysine and threonine. It also may be used as a fertilizer, as in rice fields. The algae can add to the rice land more nitrogen than could be provided by fertilizer application.

Thailand is harvesting 5,000 tons of algae and other small marine life per year and using it for human consumption. The processed product looks and smells like anchovy paste and is used both alone and in mixtures with other foods. It is high both in protein and in vitamin B_{12}. Work on mass-producing algae as a possible food source has been under way at the University of Texas under Dr. J. Myers.

With 10,000 species of algae, scientists believe that varieties can be found to suit every taste--or can be flavored to do so. Chlorella has a vegetable taste. Dr. J. Jorgenson of Venzuela found that cases of malnutrition were aided by algal soup.

3.12 PROLONGATION OF THE KEEPING QUALITY OF FISH AND SHELLFISH BY ANTIBIOTICS

Lerke, Peter A. and Farber, Lionel (The George Williams Hooper Foundation, San Francisco, California)
Antibiotics Annual 1956-1957, pp. 966-974 (1957) Medical Encyclopedia, Inc., New York, N. Y.

Nineteen antibiotics were screened for their ability to prolong the storage life of sole fillets at 42° F. (5.5° C.). The criteria used besides the organoleptic judgment were the content of volatile reducing substances, total volatile, and trimethylamine nitrogen, as well as the total number of viable aerobic bacteria in press juices of the fish and shellfish. Penicillin, bacitracin, dihydrostreptomycin, rimocidin, tryothricin, amimycin, neomycin, carbomycin, polymycin B, thiostrepton, amphotericins A and B, nystatin, and cycloserine were found to have no significant effect on the spoilage of sole fillets at 42° F. (5.5C.). Novobiocin and chloramphenicol had a slight effect, prolonging the storage life by one to two and three to four days, respectively. The most active of the substances tested were tetracyclines, with chlortetracycline being somewhat more active at lower concentrations and tetracycline and oxytetracycline being somewhat comparable in their activities. Data showing the action of chlortetracycline in prolonging the storage time of round spawning Pacific herring and of whole unpeeled white shrimp were also obtained. The effect on whole fish and shrimp is being studied in greater detail. The results to date show that such an antibiotic as chlortetracycline can definitely supplement the usefulness of refrigeration in prolonging the storage life of fish and shellfish beyond that with refrigeration alone. Without refrigeration, the antibiotics would appear to have only limited usefulness, if any at all.

See table 1, over.

(over)

Authors' summary

7.73 TECHNICAL NOTE NO. 36 - - DETERMINING FISH CONTENT OF FROZEN FRIED FISH STICKS

Frascatore, Anthony J., Jr. (Fishery Technological Laboratory, U. S. Fish and Wildlife Service, East Boston, Massachusetts)
Commercial Fisheries Review 19, 30-33 (January 1957)

A simple and rapid method for determining the percent by weight of fish flesh in frozen fried fish sticks has been developed at the technological laboratory of the U. S. Fish and Wildlife Service at East Boston, Massachusetts. It consists essentially of the following steps: (1) weighing the whole frozen fried fish stick, (2) dipping the fish stick in a colored solution (copper sulfate) at room temperature for a specified time, (3) removing excess moisture by rolling in a paper towel, (4) removing the coating on the fish stick by scraping with a spatula, (5) weighing the remaining fish, and (6) calculating the content of fish in the fish stick by the use of the following formula:

$$\text{Percent fish meat} = \frac{(\text{wt. of fish meat after removal of coating}) \ 100}{(\text{wt. of whole frozen-fried fish stick})}$$

The weighing and removal of the coating should be carried out as rapidly as is compatible with good care. The total elapsed time for analysis of each stick should not exceed 3½ minutes. A period of time greater than this may (1) permit errors resulting from the condensation of moisture on the fish stick or loss of water from the fish to the coating and (2) by allowing the fish stick to thaw or soften, make it difficult to scrape off the coating without removing some of the fish meat.

Detailed instructions for removing the coating from the fish sticks are included in this report.

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ABSTRACTER: Kathryn L. Osterhaug

3.231 FREEZERS

Anonymous
Food Engineering 29, 101-132 (January 1957)

New freezer units as well as existing units are pictured and described in detail, giving the most recent data on the present-day new and faster units. The following subjects are described:

Plate freezers
- Unitized plate freezers
- Fast hydraulic freezer
- Giant, single unit freezer

Air-blast freezers
- Continuous shelf freezer
- Spiral belt freezer
- Conveyorized-tray freezing
- Three-stage belt tunnel

Direct-immersion freezing
- Rotary can freezer
- Tubular immersion freezer

Continuous liquid freezers
- Rotary liquid freezer
- Revamped ice cream unit
- New general-product unit

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ABSTRACTER: Martin Heerdt

8.7 FINDING THE FACTS BEFORE SETTING THE SPECIFICATIONS. III. AVOIDING THE WRONG APPROACHES

Toulouse, Julian H. (Owens-Illinois Glass Co., Toledo, Ohio)
Food Technology 11, 6-10 (March 1957)

The correctness of a specification is determined by the mathematical relation between use and production, together with cost. Specifications should be based on facts. The facts should be known first. They must come from a study of the product, its use, and its production. One of these three considerations alone, or any pair, is not enough.

Correct specifications therefore mean an open, cooperative effort by maker and user. Each party must be conversant with the problems of the other, and both must be willing to study the overall problem.

It might be pointed out that specifications are not rubber bands--to be stretched when convenient, then a little farther, and farther, until the whole structure fails.

The accompanying chart (figure 1) shows some of the factors in specifications that affect costs. Use costs decrease, for example, with less variable material; conversely, they increase as the variability increases. Procurement costs, on the other hand, go up with tighter specifications, simply because it costs more to make material under closer tolerances. The real cost is the sum of the use cost plus the purchase cost. These combined costs pass through a minimum point, which gives the best specification for the user.

See illustration, over.

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ABSTRACTER: F. Bruce Sanford

ANTIBIOTICS FOR FISH

REVIEW OF FREEZER EQUIPMENT

FISH STICK STANDARDS

SETTING UP SPECIFICATIONS

3.231

Plate, tray, and room units
Double-contact plates
Continuous and batch cart tunnels
Blast rooms for bulk foods

Manufacturers list

8.7

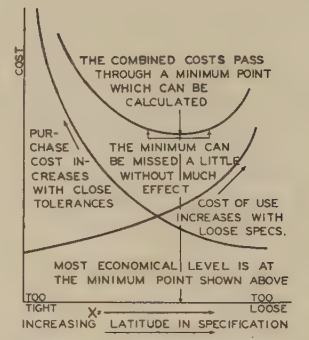

COST
THE COMBINED COSTS PASS THROUGH A MINIMUM POINT WHICH CAN BE CALCULATED
PUR-CHASE COST IN-CREASES WITH CLOSE TOLERANCES
THE MINIMUM CAN BE MISSED WITHOUT MUCH EFFECT
A LITTLE
COST OF USE INCREASES WITH LOOSE SPECS.
MOST ECONOMICAL LEVEL IS AT THE MINIMUM POINT SHOWN ABOVE
TOO TIGHT
TOO LOOSE
INCREASING LATITUDE IN SPECIFICATION

Figure 1. A cost relationship due to change in specifications.

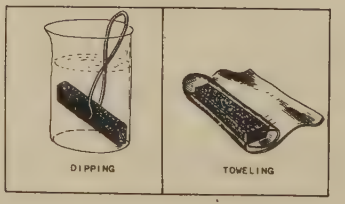
3.12

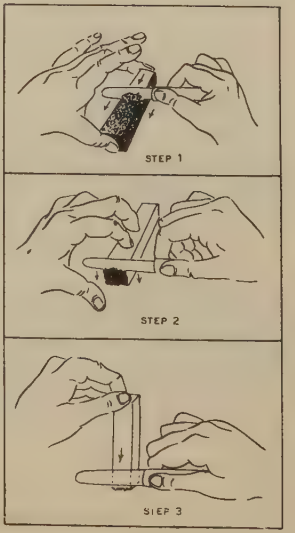
Table 1. Effect of Various Concentrations of Antibiotics on the Spoilage of Sole Fillets at 5.5 C. (42 F.)

Days stored	Antibiotic, γ/ml.	VRS*			TVN**			TMN†			Bacteria††		
		0	5	25	0	5	25	0	5	25	0	5	25
0	Tetracycline	4.7	4.7	4.7	0	0	0	0	0	0	5.8	5.8	5.8
	Oxytetracycline	2.0	2.0	2.0	0	0	0	0	0	0	6.0	6.0	6.0
	Chlortetracycline	4.0	4.0	4.0	0	0	0	0	0	0	5.9	5.9	5.9
4	Tetracycline	21.0	- -	- -	10.0	- -	- -	5.0	- -	- -	6.0	4.9	5.2
	Oxytetracycline	- -	20.0	8.0	- -	15.0	5.3	- -	5.5	0	- -	8.0	6.9
	Chlortetracycline	22.0	1.6	1.4	10.0	1.6	1.8	4.9	0	0	6.2	4.2	4.2
7	Tetracycline	- -	7.5	3.2	9.5	2.0	2.0	8.0	0	0	- -	6.8	5.4
	Chlortetracycline	27.5	4.0	5.5	10.0	2.5	2.3	8.0	0	0	7.6	5.5	4.5
10	Tetracycline	- -	11.5	3.0	- -	7.5	3.5	- -	4.3	0	- -	8.2	7.6
	Chlortetracycline	- -	3.0	3.0	- -	2.5	2.3	- -	0	0	- -	7.5	5.9

* Volatile reducing substances as μEq. /5 ml. of press juice.
** Total volatile nitrogen as mg. /100 ml. of press juice.
† Trimethylamine nitrogen as mg. /100 ml. of press juice.
†† Log total viable aerobic bacteria/ml. of press juice.
Samples judged organoleptically to be spoiled.

7.73 (Cross Reference: 3.237)





0.5 REDUCTION OF TRIMETHYLAMINE OXIDE BY BACTERIA
I. THE ENTEROBACTERIACEAE

Wood, A. J. and Baird, Elizabeth A.
Journal of the Fisheries Research Board of Canada 6, 194-201 (August 1943)

(Abstract of this article appears under 2.01 page 7 - June 1957)

0.5 MICROBES IN THE FISH INDUSTRY AND THEIR EFFECTS

Behre, A.
Fette, Seifen, Anstrichmitt, 58, 416-423 (1956)
Food Science Abstracts 29, 35 (Febraury 1957)

By the time fish reaches the consumer, it contains numerous types of microorganism; most types are harmless, but pathogenic (typhus, para-typhus, enteritis botulinus) bacteria may occasionally be present. Data on the characteristic properties and the behaviour of the very varied microflora of fish are summarized in tables, which provide information concerning the route of contamination, the effects of temperature, oxygen, pH, and salts, methods of identification of the bacteria, symptoms of fish poisoning, etc.

1.0111 COMMERCIAL FISHERIES OF THE PRAIRIES

Butler, G. E.
Canadian Fisherman 43, 6, 8, 10 (August 1956)

(Abstract of this article appears under 1.92 page 3 - January 1957)

1.0111 NOVA SCOTIA PLANT MAKES INSULATION FROM EEL GRASS

Anonymous
Maine Coast Fisherman 11, 5 (December 1956)

(Abstract of this article appears under 6.3 page 21 - February 1957).

1.0115 THE MAINE SARDINE INDUSTRY IS STILL GROWING

Anonymous
Canner and Freezer 122, 11-14 (April 30, 1956)

(Abstract of this article appears under 1.2 page 3 - December 1956)

1.1 EFFECT OF RAW MATERIAL ON TUNA--MEAL QUALITY

Grau, C. R.; Barnes, R. N.; Karrick, Neva L., and McKee, Lynne G.
Commercial Fisheries Review 18, 18-21 (July 1956)

(Abstract of this article appears under 6.190 page 19 - March 1957)

1.1 NOTE ON HONEYCOMBING IN DECOMPOSED TUNA

Hillig, Fred
Journal of the Association of Official Agricultural Chemists 39, 1015-1016 (November 15, 1956)

(Abstract of this article appears under 3.33 page 15 - April 1957)

1.11 FAT STORAGE IN THE MACKEREL (SCOMBER SCOMBRUS L.)

Luhmann, M.
Arch. Fischereiwiss 7, 61-74 (1956) (Summary in English)
Food Science Abstracts 29, 36 (February 1957)

1.85 PRELIMINARY RESULTS OF DEEP-WATER EXPLORATION FOR SHRIMP IN THE GULF OF MEXICO BY THE M/V OREGON 1950-1956

Bullis, Harvey R., Jr.
Commercial Fisheries Review 18, 1-12 (December 1956)

(Abstract of this article appears under 2.12 page 9 - June 1957)

1.85 SHRIMP EXPLORATIONS OFF THE WASHINGTON COAST, FALL 1955 AND SPRING 1956

Schaefers, Edward A. and Johnson, Harold C.
Commercial Fisheries Review 19, 9-25 (January 1957)

(Abstract of this article appears under 2.12 page 5 - July 1957)

1.85 BLACK SPOT ON PRAWNS

Anonymous
Food Manufacture 32, 175 (April 1, 1957)

(Abstract of this article appears under 2.03 page 3 - July 1957)

2.05 EFFECT OF CHLORTETRACYCLINE TREATMENT OF FISH ON DEVELOPMENT OF CERTAIN FOOD-POISONING BACTERIA

Bluhm, H. M. and Tarr, H. L. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 106, 8-10 (September 1956)

(Abstract of this article appears under 3.12 page 9 - April 1957)

2.05 EFFECT OF FREEZING ON COLIFORM BACTERIA AND METHODS OF DETECTION IN FROZEN FISH FILLETS AND BLOCKS

Dussault, H. P.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 65, 12-16 (October 1956)

(Abstract of this article appears under 0.5 page 1 - July 1957)

2.05 STUDIES ON THE FOOD POISONING ASSOCIATED WITH PUTREFACTION OF MARINE PRODUCTS

Kawabata, Toshiharu; Ishizaka, Kimishige; Miura, Toshiyuki; and Sasaki, Tadanao
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 1, 41-47 (1956) (English abstract, tables, and figures)

VII. An outbreak of allergy-like food poisoning caused by "Sashimi" of Parathunnus mebachi and the isolation of causative bacteria.

2.12 COLLECTIONS BY THE OREGON IN THE GULF OF MEXICO

Springer, Stewart and Bullis, Harvey R., Jr.
Special Scientific Report: Fisheries No. 196, 134 pp. (December 1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

2.12 A REPORT OF DRIFT-BOTTLE SURVEYS OFF KAMCHATKA, USSR IN 1940 AND 1941

Taguchi, Kisaburo
Bulletin of the Japanese Society of Scientific Fisheries 22, No. 7, 393-399 (1956) (In English)

During the 1930's the fishermen decided it was mainly the currents that drove the schools of salmon on their migration route amid the vastness of the ocean. With this hypothesis in mind a series of drift-bottle surveys were performed on a large scale during the fishing seasons of 1940 and 1941.

2.14 FISHING FOR DOLPHINS IN THE WESTERN PART OF THE JAPAN SEA. II. WHY DO THE FISH TAKE SHELTER UNDER FLOATING MATERIALS?

Kojima, Shumpei
Bulletin of the Japanese Society of Scientific Fisheries 21, No. 10, 1049-1052 (1956) (English summary, figures, and tables)

Bundles of bamboo poles each built like a raft are set along the Japan sea coast to provide shelters for the dolphin (Coryphaena hippurus). When a sufficient number of dolphin is found sheltering under a raft, in search of food, fishermen enclose and capture them in a purse seine.

3.17 PROBLEMS IN THE USE OF ANTIBIOTICS FOR PRESERVING MEAT AND FISH

Ingram, M.; Barnes, Ella M., and Shewan, J. M.
Food Science Abstracts 28, 121-136 (April 1956)

(Abstract of this article appears under 3.12 page 9 - January 1957)

3.17 SODIUM NITRITE ON THE STORAGE OF COD

Trzesinski, P. and Zachorowski, T.
Prace Morsk. Inst. Ryback, Gdyni No. 8, pp. 375-386 (1955)
Food Science Abstracts 28, 562 (December 1956)

3.17 STUDIES ON THE INFLUENCE OF NITRITE-TREATED ICE ON THE STORAGE LIFE AND QUALITY OF BALTIC HADDOCK

Borowik, J.; Fischer, E.; Ostrowski, S.; and Trzesinski, P.
Przem. Spozyw. 10, 282-283 (1956) (Summary in English 283)
Food Science Abstracts 29, 28 (February 1957)

The freshness of haddock preserved in ice containing 0.1% of sodium nitrite, at about 10° C, was better than that of controls kept in ordinary ice; the amounts of nitrite penetrating into the fish flesh were variable, but did not exceed 11 mg. It is recommended that the nitrite-containing ice should be applied to gutted fish and as quickly as possible. Owing to the toxicity of nitrite, strict supervision is required when fish is chilled in ice containing nitrite.

3.239 CHANGES IN THE WATER-HOLDING CAPACITY AND CATIONIC SHIFTS DURING THE HEATING AND FREEZING AND THAWING OF MEAT AS REVEALED BY A SIMPLE CENTRIFUGAL METHOD FOR MEASURING SHRINKAGE

Wierbicki, Eugen; Kunkle, L. E.; and Deatherage, F. E.
Food Technology 11, 69-73 (February 1957)

(Abstract of this article appears under 0.35 page 1 - June 1957)

3.239 THE DEFROSTING OF QUICK-FROZEN MEAT

Almasi, E.
Elelmezesi Ipar 10, 80-96 (1956)
Food Science Abstracts 28, 448 (October 1956)

A method was developed for calculating the temperatures at the surface and in the thermic centre of meat in relation to the physical characteristics of the surrounding atmosphere (temperature, air-flow, etc.).

3.239 CHANGE IN QUALITY OF MEAT AS RELATED TO RATE OF DEFROSTING

Almasi, E.
Elelmezesi Ipar 10, 25-28 (1956)
Food Science Abstracts 28, 448 (October 1956)

3.2497 THE TIME-TEMPERATURE TOLERANCE OF FROZEN FOODS. II. RETAIL PACKAGES OF FROZEN PEACHES

Guadagni, D. G.; Nimmo, C. C.; and Jansen, Eugene F. (Western Utilization Research Branch, United States Department of Agriculture, Albany 10, California)
Food Technology 11, 33-42 (January 1957)

3.2497 THE TIME-TEMPERATURE TOLERANCE OF FROZEN FOODS. III. EFFECTIVENESS OF VACUUM, OXYGEN REMOVAL, AND MILD HEAT IN CONTROLLING BROWNING IN FROZEN PEACHES

Guadagni, D. G. and Nimmo, C. C. (Western Utilization Research Branch, United States Department of Agriculture, Albany 10, California)
Food Technology 11, 43-47 (January 1957)

3.2497 (Cross Reference: 7.89)

THE TIME-TEMPERATURE TOLERANCE OF FROZEN FOODS. IV. OBJECTIVE TESTS TO MEASURE ADVERSE CHANGES IN FROZEN VEGETABLES

Dietrich, W. C.; Lindquist, F. E.; Miers, J. C.; Bohart, G. S.; Neumann, H. J.; and Talburt, W. F. (Western Utilization Research Branch, United States Department of Agriculture, Albany 10, California)
Food Technology 11, 109-113 (February 1957)

3.26 REFRIGERATION OF FISH - PART 5. DISTRIBUTION AND MARKETING OF FROZEN FISHERY PRODUCTS

Slavin, Joseph W. and Heerdt, Martin
Fishery Leaflet 431, 78 pp. (October 1956)

(Abstract of this article appears under 3.25 page 11 - June 1957)

3.26 HOUSEHOLD CONSUMER PREFERENCES FOR CANNED FISHERY PRODUCTS, 1956

Anonymous
Circular 45, 46 pp. (1956) United States Department of the Interior, Fish and Wildlife Service, Washington 25, D. C.

This publication contains a graphic presentation of the results of a survey of the preferences for canned fish and shellfish in United States households.

3.26 THE FROZEN FOOD CONFERENCE. PART 3. HOW TO HANDLE FROZEN MEATS

Wiesman, Clarence K.
Refrigerating Engineering 64, 60-61, 107 (October 1956)

Even under the most ideal conditions there is a limit to the storage life of frozen meats. Four conditions must be maintained for proper handling: hold product at 0° F. or lower; minimize fluctuation in storage temperature; avoid thawing and refreezing; educate the consumer as to proper storage and preparation of frozen foods in the home.

4.21 FATTY ACIDS. PART 5. APPLICATIONS OF THE WOODWARD cis-HYDROXYLATION PROCEDURE TO LONG-CHAIN OLEFINIC COMPOUNDS

Gunstone, F. D. and Morris, L. J.
Journal of the Chemical Society pp. 487-490 (January 1957)

Hydroxylation involving use of iodine and silver acetate in wet acetic acid is a satisfactory means of oxidizing long-chain ethylenic compounds and has some advantages over other methods of cis-hydroxylation.

4.21 THE OXIDATION OF MONOETHENOID FATTY ACIDS AND ESTERS. THE AUTOXIDATION PRODUCTS OF ERUCIC ACID AND ITS METHYL AND n-PROPYL ESTER

Skellon, J. H. and Taylor, P. E.
Journal of Applied Chemistry 7, 67-72 (February 1957)

The products of catalytic autoxidation of highly purified erucic acid and its methyl and propyl esters have been investigated. Saponification of the oxidized esters gives acidic dimeric compounds which eventually break down to mixtures containing keto-hydroxy, unsaturated ketonic, and epoxy derivatives in addition to 13: 14-dihydroxybehenic acid.

The characteristic oily resinous derivatives invariably found in the oxidation products contain carbonyl groups.

Some possible reaction mechanisms are discussed.

4.29 PHOSPHORUS DERIVATIVES OF FATTY ACIDS. II. DIETHYL ACYLOXYETHYLPHOSPHONATES

Ackerman, Bernard; Jordan, T. A.; and Swern, Daniel
Journal of the American Chemical Society 78, 6025-6027 (December 5, 1956)

4.29 ISOMERIZATION OF LINOLEIC, LINOLENIC, AND OTHER POLYUNSATURATED ACIDS WITH POTASSIUM TERTIARY BUTOXIDE AND ITS APPLICATION IN THE SPECTROPHOTOMETRIC ESTIMATION OF THESE ACIDS

Sreenivasan, S. and Brown, J. B. (Ohio State Univ., Columbus)
J. Am. Oil Chemists' Soc. 33, 521-6 (1956)
Chemical Abstracts 51, 741 (January 10, 1957)

4.29 ORGANIC SULFUR DERIVATIVES. I. ADDITION OF MERCAPTOACETIC ACID TO LONG-CHAIN MONOUNSATURATED COMPOUNDS

Koenig, N. H. and Swern, Daniel (Philadelphia, Pa.)
Journal of the American Chemical Society 79, 362-365 (January 20, 1957)

Sulfides are formed by the free-radical addition of mercaptoacetic acid to oleic acid, methyl oleate, methyl ricinoleate or 10-undecenoic acid. Diesters have been prepared by esterifying the product from oleic acid, 9 (10)-(carboxymethylthio)-10-stearic acid and by treating n-butyl oleate with ethyl mercaptoacetate. In developing optimum reaction conditions, the yield of urea complexes serves as a key method of determining the extent of reaction. Supporting evidence for the structure of the products is provided by molecular refraction, infrared and X-ray data.

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst
Analytical Chemistry
Archives of Biochemistry and Biophysics
Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemical Engineering
Canadian Journal of Chemistry
Canner and Freezer
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Processing
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
Federation Proceedings
Feed Bag
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fishing Gazette
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Gourmet
Industrial and Engineering Chemistry
Industrial Refrigeration
Institutions
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Nutrition
Journal of Organic Chemistry
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Chemical Society (London)
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fisheries Abstracts
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

6.132 EFFECT OF AUTOCLAVING TEMPERATURE AND SUBSEQUENT DRYING ON THE CHEMICAL COMPOSITION OF FISH

Podsevalova, L. A.
Referat. Zhur., Khim. No. 4926 (1955)
Chemical Abstracts 50, 13324 (September 25, 1956)

In the prepn. of fish meal during autoclaving there is a decrease in the moisture content of fish, a decrease in the total N content, and a degradation of proteinaceous substances accompanied by a hydrolytic splitting and partial formation of peptones, amino acids, and nitrogenous bases. To prevent deep-seated changes in proteinaceous substances autoclaving should be carried out at temps. not above 117°.

6.132 NITROGEN CONTENT OF PASTE-YIELDING SUBSTANCES IN PERCH UPON AUTOCLAVING AND SUBSEQUENT DRYING

Podsevalova, L. A.
Referat. Zhur., Khim. No. 4925 (1955)
Chemical Abstracts 50, 13324 (September 25, 1956)

The variations in the quantity of total and protein N in aq. exts. from cooked and dried fish depend on the autoclaving temp. and are connected to the changes in the quantity of N from paste giving substances which pass into these fractions.

6.137 FRACTIONATION OF SPERM OIL

Brabets, Robert I.; Hlavacek, Robert J.; and Fritz, Earle (Swift & Co.)
U. S. 2,730,538 (Jan. 10, 1956)
Chemical Abstracts 50, 6820 (May 10, 1956)

6.137 REFINING OF FISH OILS

Fukushima, Masatoshi and Tanaka, Takeshi
Japan 335, ('55), Jan. 24
Chemical Abstracts 50, 11691 (August 25, 1956)

Yellowish brown fish oil 100, acid no. 2.7, is stirred with water 100 contg. $Na_2Cr_2O_7$ 0.15, and 5% H_2SO_4, 6 parts is added dropwise. The mixt. is stirred for 30 min. and heated gradually to 60°. The oily layer is washed with water at 80°, heated at 100°, 50 parts 0.8% NaOH added, and stirred for 30 min. at 90°. The top layer of oil is washed with water and dried to give 98.2 parts light-colored refined oil.

6.137 REFINING OF SQUALENE AND FISH-LIVER OIL

Kawakami, Yasota (Kawakami Research Institute, Ltd.)
Japan 1740, (March 16, 1955)
Chemical Abstracts 51, 744 (January 10, 1957)

Crude squalene 100 mixed with Na 1 part were dispersed in C_6H_6 and the product fractionated to give 85% of a main fraction, b_1 170 to 200°, an odorless oil with a cloud point of -14°; similarly, fish-liver oils are made odorless by this method.

6.3 A METHOD OF DRYING SEAWEED USING A STEAM-HEATED DRUM DRYER

Booth, E. (Institute of Seaweed Research, Inveresk, Midlothian)
Journal of the Science of Food and Agriculture 7, 705-710 (November 1956)

Seaweed drying was carried out on a semi-commercial double-drum dryer 18 inches in diameter by 18 inches wide at a steam pressure of 80 pounds per square inch gage. The cost of producing dry rockweed (Ascophyllum nodosum) has been estimated at £ 13 to £ 15 per ton. Fuel consumption for drum drying is estimated at 40 to 45 percent of the fuel used in air drying. Drum drying is 15 to 20 percent cheaper than the through-circulation method of drying seaweed.

6.3 INSTITUTE OF SEAWEED'S ACTIVITIES

Anonymous
Chemistry and Industry No. 47, 1415 (December 1, 1956)

The Institute of Seaweed Research having fulfilled its original mandate, has now reduced the scope of its activities. Its main concern will now be the support of fundamental seaweed studies at the universities, the maintenance of an information service, the supply of algal chemicals at cost and the provision of technical assistance and advice to those interested in seaweed utilization in the crofting communities in Scotland.

6.54 SOUTH AFRICAN RESEARCH YIELDS A TASTELESS FISH FLOUR FOR THE ENRICHING OF BREAD

Anonymous
Food Industr. S. Afr. 8, 31 (1955)
Food Science Abstracts 29, 33 (February 1957)

A tasteless fish flour was prepared on a laboratory scale from maasbanker, a fish caught in large quantities in South African waters and at present mostly used for reduction to fish meal. The flour was completely neutral and contained protein (about 80%), and minerals, but no vitamins. The process used for preparation of the flour is adaptable for large-scale production, and when sufficient quantities become available, the flour will be used to enrich bread. When 8% of the flour was incorporated in bread, it could not be detected by taste or smell.

6.54 FISH FLOUR FOR HUMANS

Anonymous
Chemical and Engineering News 35, 22 (May 20, 1957)

The first solvent extraction fish flour plant in the world will be built at New Bedford, Massachusetts. Fish flour produced by this process is reported to be tasteless, odorless, of high nutritive value, and lower in cost than other high quality protein used as an additive in pharmaceuticals, foods, and animal feeds.

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6.4 SPERM-WHALE OIL. III. THE PRODUCTION OF SOAP FROM HIGHER ALCOHOL

Fujii, Hisashi and Moro, Mikio (Japan Marine Products Co., Odawara)
Repts. Japan Marine Products Co. Research Lab. No. 7, 16-17 (1956)
Chemical Abstracts 50, 11688 (August 25, 1956)

Soap was made with alkali from sperm wax or hexadecyl alc. The reaction progressed easily both under or at atm. pressure at about 270°. The amt. of alkali influenced the reaction rate.

6.4 NEW PRODUCTS FROM FISH OILS PART 2. POLYAMINO FATTY ACIDS DERIVED FROM FISH OILS

McDonald, R. N. and Gruger, Edward H., Jr.
Commercial Fisheries Review 18, 7-11 (September 1956)

(Abstract of this article appears under 4.29 page 7 - April 1957)

6.4 CHOLESTEROL FROM CUTTLEFISH OIL

Imai, Ichiro
Japan 227, ('55), Jan. 21
Chemical Abstracts 50, 11690 (August 25, 1956)

Fatty acid (1 kg.) obtained from decompn. of soap stock of cuttlefish oil, with a sapon no. of 180.7, neutralization no. 173.6, and contg. 8.9% unsaponifiable substance, was distd. in vacuo to obtain 223 g. of a residue with a neutralization no. of 56.9 and contg. 28.6% unsaponifiable substance. The residue was sapond. with alc. KOH, extd. with petr. ether, the solvent removed, and the residue recrystd, from MeOH to give 37 g. cholesterol, m. 148.5°.

7.8 PROGRESS IN FOOD SCIENCE BY THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Anonymous
Food Manufacture 31, 179-181 (May 1956)

(Abstract of this article appears under 0.6 page 1 - January 1957)

7.8 QUALITY CONTROL FOR THE CANNER AND FREEZER. BASIC PRINCIPLES AND INSTRUMENTATION. PART 1.

Kramer, Amihud and Twigg, Bernard A.
Canner and Freezer 123, 16-19 (July 23, 1956)

(Abstract of this article appears under 0.112 page 1 - February 1957)

7.8 RETENTION OF TASTE SENSITIVITY

Brandt, Donald A. and Hutchison, E. Paul
Food Technology 10, 419-420 (September 1956)

Data collected from experiments with five different products ranging in intensity from a low threshold to a high threshold have shown conclusively that the sextuple trios are reliable, workable, and efficient from these points of view: individual discernment and mechanical ability for adoption.

7.80 THE VALUE OF TRAINING A SENSORY TEST PANEL

Bennett, Grace; Spahr, Barbara M.; and Dodds, Mary L. (The Pennsylvania State University, University Park)
Food Technology 10, 205-208 (April 1956)

A three-week period of training resulted in improved performance in judging aroma and flavor of varying concentrations of rancid beef. Performance was judged by a comparison of the regression formulae of scores versus the log of the concentration of the rancid beef. Variances about the mean scores was used as a measure of the reproducibility of scores. Consistency of performance was improved by training and was greatest for the extremes of quality, the least and most rancid samples.

7.80 GAS CHROMATOGRAPHY--A NEW METHOD FOR THE SEPARATION AND IDENTIFICATION OF VOLATILE MATERIALS IN FOODS

Dimick, K. P. and Corse, J. (Western Utilization Research Branch, United States Department of Agriculture, Albany, California)
Food Technology 10, 360-364 (August 1956)

Volatile organic substances in foods and food products, and other nonvolatile materials which may be converted into volatile compounds by appropriate chemical means, may be analyzed by gas chromatography, provided they can be isolated in a concentrated form from the nonvolatile constituents. The object of this paper is: (a) to present a description of a gas chromatographic apparatus and its operations, and (b) to describe methods for isolating and concentrating these volatiles.

8.59 BIOCHEMICAL STUDIES ON THE VITAMIN A IN FISH VISCERA. III. THE OXIDATION OF VITAMIN A IN FISH LIVER OILS

Ono, T. and Nagayama, F.
J. Tokyo Univ. Fish., 41, 153-162 (1955)
Food Science Abstracts 28, 266 (June 1956)

Vitamin A in fish liver oil was actively oxidized in the presence of a lipoxidase found in acetone-dried preparations of mackerel liver and of perch liver which does not contain vitamin A.

8.59 THE DEMONSTRATION OF ACID MUCOPOLYSACCHARIDES IN THE GLANDS OF LORENZINI OF THE PIKED DOGFISH (ACATHIAS VULGARIS)

Jensen, C. E. (University of Copenhagen, Denmark)
The Biochemical Journal 64, 3p (September 1956)

8.59 ADENOSINE DEAMINASE OF CRUSTACEANS

Roush, Allan H. and Betz, Robert F. (Illinois Inst. of Technol., Chicago)
Biochim. et Biophys. Acta 19, 579-80 (1956)
Chemical Abstracts 50, 10935 (August 10, 1956)

Lobster (Homarus americanus) hepatopancreas exts. contained adenosine deaminase (I), guanase (II), and inosine phosphorylase. No adenase was found. Crayfish hepatopancreas exts. contained I and II. Neither ext. had adenase.

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